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January 1994

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FEDERAL AVIATION ADMINISTRATION

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PREFACE

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ANGOLA	LUANDA
ARGENTINA	BUENOS AIRES
AUSTRALIA	SIDNEY
AUSTRIA	VIENNA
AZORES	SANTO MARIA
BAHAMAS	NASSAU
BAHRAIN	BAHRAIN
BANGLADESH	DHAKA (DACCA)
BELGIUM	BRUSSELS
BERMUDA	BERMUDA
BOLIVIA	LA PAZ
BRAZIL	RIO DE JANEIRO
BULGARIA	SOFIA
BURMA	RANGOON
CANADA	OTTAWA
CAPE VERDE ISLANDS	AMILCAR CABRAL
CHILE	SANTIAGO
CHINA	BEIJING
CHINA (FORMOSA)	TAIPEI
COLOMBIA	BOGOTA
CUBA	HAVANA
CYPRUS	NICOSIA
CZECHOSLOVAKIA	PRAGUE
DENMARK	COPENHAGEN
DOMINICAN REPUBLIC	SANTO DOMINGO
ECUADOR	GUAYAQUIL
ENGLAND	LONDON
ETHIOPIA	ADDIS ABABA
EYGPT	CAIRO
FIJI	NANDI
FINLAND	HELSINKI
FRANCE	PARIS
FRENCH POLYNESIA	TAHITI
GERMANY (EAST)	BERLIN
GERMANY (WEST)	FRANKFURT
GHANA	ACCRA
GREECE	ATHENS
GREENLAND	SONDRE STROMFJORD
GUYANA	GEORGETOWN
HAITI	PORT-AU-PRINCE
HONDURAS	TEQUCIGALPA
HONG KONG	HONG KONG
HUNGARY	BUDAPEST
ICELAND	REYKJAVIK
INDIA	BOMBAY
INDIA	CALCUTTA
INDIA	DELHI
INDIA	MADRAS
INDONESIA	JAKARTA
IRAN	TEHRAN (NOT AVBL)
IRELAND	SHANNON
ISRAEL	TEL AVIV
ITALY	ROME
JAMAICA	KINGSTON
JAPAN	TOKYO
JORDAN	AMMAN
KENYA	NAIROBI
KOREA (SOUTH)	SEOUL
KUWAIT	KUWAIT
LEBANON	BEIRUT
LIBERIA	ROBERTS
LIBYA	TRIPOLI
MALAYSIA	KUALA LUMPUR
MALTA	LUQA
MAURITIUS	PLAISANCE
MEXICO	MEXICO CITY
MOROCCO	CASABLANCA
MOZAMBIQUE	MAPUTO
NAURU ISLAND	NAURU
NETHERLANDS	AMSTERDAM
NETHERLANDS ANTILLES	CURACAO
NEW GUINEA	PORT MOSEBY
NEW ZEALAND	AUCKLAND
NIGERIA	LAGOS
NORWAY	OSLO
PAKISTAN	KARACHI
PANAMA	TOCUMEN
PARAGUAY	ASUNCION
PERU	LIMA
PHILLIPINES	MANILLA
POLAND	WARSAW
PORTUGAL	LISBON
ROMANIA	BUCHAREST
SAMOA	FALEOLA
SAUDI ARABIA	JEDDAH
SENEGAL	DAKAR
SEYCHELLES	MAHE
SINGAPORE	SINGAPORE
SOLOMON ISLANDS	HONIARA
SOUTH AFRICA	JOHANNESBURG
SOVIET UNION	MOSCOW
SPAIN	MADRID
SRI LANKA	COLOMBO
SUDAN	KHARTOUM
SURINAME	PARAMARIBO
SWEDEN	STOCKHOLM
SWITZERLAND	ZURICH
SYRIA	DAMASCUS
TANZANIA	DAR-ES-SALAAM
THAILAND	BANKOK
TRINIDAD	PORT OF SPAIN
TUNISIA	TUNIS
TURKEY	ANKARA
URUGUAY	MONTEVIDEO
VENEZUELA	CARACAS
YUGOSLAVIA	BELGRADE
ZAIRE	KINSHASA
ZAMBIA	LUSAKA
ZIMBABWE	HARARE

1.7 Pre-Flight Information Service at Aerodromes Available to International Flights.

Pre-Flight Information Units in the U.S. are either FAA operated Flight Service Stations (FSS) or National Weather Service operated Weather Service Offices (WS).

1.7.1 Flight Service Stations (FSSs) are air traffic facilities which provide pilot briefings, en route communications and VFR search and rescue services, assist lost aircraft and aircraft in emergency situations, relay ATC clearances, originate Notices to Airmen, broadcast aviation weather and National Airspace System (NAS) information, receive and process IFR flight plans, and monitor NAVAIDS. In addition, at selected locations FSSs provideEn Route Flight Advisory Service (Flight Watch), take weather observations, issue airport advisories, and advise Customs and Immigration of transborder flights.

1.7.1.1 Supplemental Weather Service Locations (SWSLs) are airport facilities staffed with contract personnel who take weather observations and provide current local weather to pilots via telephone or radio. All other services are provided by the parent FSS.

1.7.1.2 Flight Service Station (FSS) locations, services and telephone information are available in the U.S. Airport/Facility Directory, Supplement Alaska and Pacific Chart Supplement.

1.7.1.3 Flight Service Station, Pre-Flight information service coverage is designed primarily to provide service within a 500 mile area of the Flight Service Station. All Flight Service Stations, nevertheless, do have telecommunications access to all of the weather and NOTAM information available, on an as needed basis, for preflight briefing to international locations with which the U.S. International NOTAM office exchanges information.

1.7.1.4 A toll-free telephone service, 1-800-WX-BRIEF (1-800-992-7433), accessible from any telephone in the Bahamas Islands, is maintained by the Miami, Florida, International Flight Service Station (IFSS) for such flight services as air defense identification zone (ADIZ) and U.S. Customs Service information and requirements, weather briefings, and flight planning. Miami IFSS also maintains a remote communications outlet, frequency 118.4 MHz, on New Providence Island for en route services to aircraft in flight.

1.7.2 National Weather Service offices provide meteorological briefing services and flight documentation only. Services are provided on request. Weather Services offices are located at each of the following aerodromes serving international civil aviation:

Associated City	*State*
Phoenix	Arizona
Tucson	Arizona
Fresno	California
Los Angeles	California
Oakland	California
San Diego	California
San Francisco	California
Windsor Locks/Bradley	Connecticut
Washington	District of Columbia
Miami	Florida
Tampa	Florida
West Palm Beach	Florida
Chicago	Illinois
Indianapolis	Indiana
New Orleans	Louisiana
Baltimore	Maryland
Boston	Massachusetts
Detroit	Michigan
Minneapolis	Minnesota
St. Louis	Missouri
Las Vegas	Nevada
Newark	New Jersey
New York	New York
Syracuse	New York
Cleveland	Ohio
Portland	Oregon
Philadelphia	Pennsylvania
Pittsburgh	Pennsylvania
Corpus Christi	Texas
Dallas	Texas
El Paso	Texas
Houston	Texas
San Antonio	Texas
Seattle	Washington
Spokane	Washington
Milwaukee	Wisconsin
Anchorage	Alaska
Cold Bay	Alaska
Fairbanks	Alaska
Hilo	Hawaii
Honolulu	Hawaii
Kahului	Hawaii
San Juan	Puerto Rico
Pago Pago	Am. Samoa

2. SUMMARY OF NATIONAL REGULATIONS

2.1 Air Regulations for the United States and areas under its jurisdiction are published in parts entitled the Federal Aviation Regulations (FAR). It is essential that persons engaged in air operations in the U.S. airspace be acquainted with the relevant regulations. Copies of the FAR parts may be purchased from the:

Superintendent of Documents
U.S. Government Printing Office
North Capitol Street, NW
Washington, D.C. 20402

2.2 The following is a partial list of FAR Parts and their Respective subject matter:

FAR part No.	Title
1	Definitions and Abbreviations
11	General Rule-Making Procedures
13	Investigation and Enforcement Procedures
21	Certification Procedures for Products and Parts
23	Airworthiness Standards: Normal, Utility, and Acrobatic Category Airplanes
25	Airworthiness Standards: Transport Category Airplanes
27	Airworthiness Standards: Normal Category Rotorcraft
29	Airworthiness Standards: Transport Category Rotorcraft
31	Airworthiness Standards: Manned Free Balloons
33	Airworthiness Standards: Aircraft Engines
35	Airworthiness Standards: Propellers
36	Noise Standards: Aircraft Type and Airworthiness Certification
37	Technical Standard Order Authorizations
39	Airworthiness Directives
43	Maintenance, Preventive Maintenance, Rebuilding, and Alteration
45	Identification and Registration Marking
47	Aircraft Registration
49	Recording of Aircraft Titles and Security Documents
61	Certification: Pilots and Flight Instructors
63	Certification: Flight Crewmembers Other Than Pilots
65	Certification: Airmen Other Than Flight Crewmembers
67	Medical Standards and Certification
71	Designation of Class A, B, C, D, and E Airspace, and Reporting Points

if a target shows no lateral or vertical motion, but increases in size, *TAKE EVASIVE ACTION.*

10.7.6 Recognize High Hazard Areas

Airways and especially VORs and Class B, C, D, and E surface areas are places where aircraft tend to cluster.

Remember, most collisions occur during days when the weather is good. Being in a ''radar environment'' still requires vigilance to avoid collisions.

10.7.7 Cockpit Management

Studying maps, checklists, and manuals before flight, with various other proper preflight planning (e.g., noting necessary radio frequecies) and organizing cockpit materials, can reduce the amount of time required to look at these items during flight permitting more scan time.

10.7.8 Windshield Conditions

Dirty or bug-smeared windshields can greatly reduce the ability of pilots to see other aircraft. Keep a clean windshield.

10.7.9 Visibility Conditions

Smoke, haze, dust, rain, and flying towards the sun can also greatly reduce the ability to detect targets.

10.7.10 Visual Obstruction in the Cockpit

Pilots need to move their heads to see around blind spots caused by fixed aircraft structures, such as door posts, wings, etc. It will be necessary at times to maneuver the aircraft (e.g., lift a wing) to facilitate seeing around this structure.

Pilots must insure that curtains and other cockpit objects (e.g., maps on glare shield) are removed and stowed during flight.

10.7.11 Lights On

Day or night, use of exterior lights can greatly increase the conspicuity of any aircraft.

Keep interior lights low at night.

10.7.12 ATC Support

ATC facilities often provide radar traffic advisories on a workload-permitting basis. Flight through the new Class C Airspace requires communication with ATC. Use this support whenever possible or when required.

AERODROMES (AGA)

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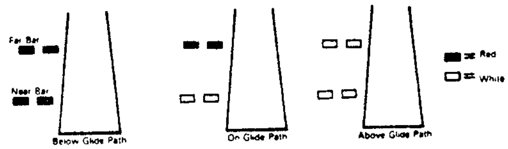
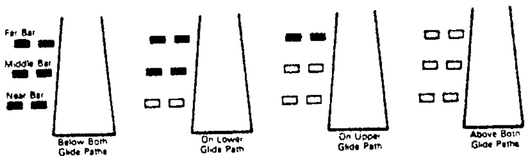
high as 4.5 degrees to give proper obstacle clearance. Pilots of high performance aircraft are cautioned that use of VASI angles in excess of 3.5 degrees may cause an increase in runway length required for landing and rollout.

10.2.1.4 The basic principle of the VISI is that of color differentiation between red and white. Each light unit projects a beam of light having a white segment in the upper part of the beam and red segment in the lower part of the beam. The light units are arranged so that the pilot using the VASI's during an approach will see the combination of lights shown below.

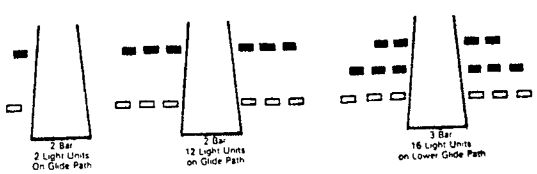
10.2.1.5 2-BAR VASI (4 light units shown)



10.2.1.6 3-BAR VASI (6 light units shown)

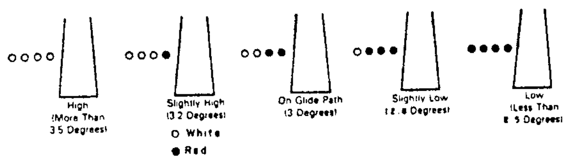


10.2.1.7 Other VASI Configurations



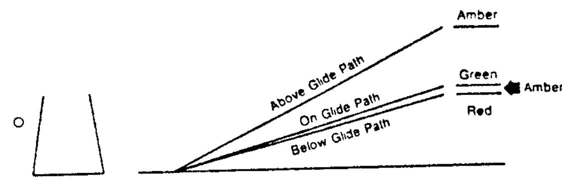
10.2.2 *Precision Approach Path Indicator (PAPI)*

10.2.2.1 The precision approach path indicator (PAPI) uses light units similar to the VASI but are installed in a single row of either 2 or 4 lights units. These systems have an effective visual range of about 5 miles during the day and up to 20 miles at night. The row of light units is normally installed on the left side of the runway and the glide path indications are as follows;



10.2.3 *Tri-color Systems*

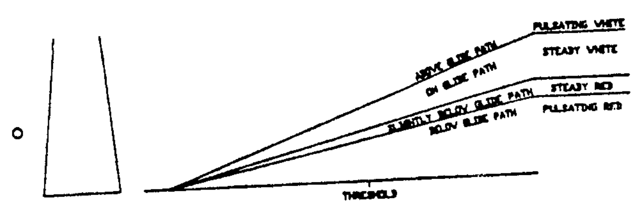
10.2.3.1 Tri-color visual approach slope indicators normally consist of a single light unit, projecting a three-color visual approach path into the final approach area of the runway upon which the indicator is installed. The below glide path indication is red, the above glide path indication is amber, and the on glide path indication is green. These types of indicators have a useful range of approximately ½ to 1 mile during the day and up to 5 miles at night depending upon the visibility conditions.



CAUTION: When the aircraft descends from green to red, the pilot may see a dark amber color during the transition from green to red.

10.2.4 *Pulsating Systems*

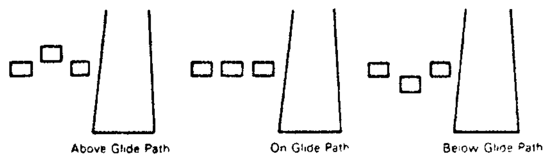
10.2.4.1 Pulsating visual approach slope indicators normally consist of a single light unit projecting a two-color visual approach path into the final approach area of the runway upon which the indicator is installed. The on glide path indication is a steady white light. The slightly below glide path indication is a steady red light. If the aircraft descends further below the glide path the red light starts to pulsate. The above glide path indication is a pulsating white light. The pulsating rate increases as the aircraft gets further above or below the desired glide slope. The useful range of the system is about four miles during the day and up to ten miles at night.



CAUTION: When viewing the pulsating visual approach slope indicators in the pulsating white or pulsating red sectors, it is possible to mistake this lighting aid for another aircraft or a ground vehicle. Pilots should exercise caution when using this type of system.

10.2.5 *Alignment of Elements Systems*

10.2.5.1 Alignment of elements systems are installed on some small general aviation airports and are a low cost system consisting of painted plywood panels, normally black and white or fluorescent orange. Some of these systems are lighted for night use. The useful range of these systems is approximately ¾ miles. To use the system the pilot positions his aircraft so the elements are in alignment. The glide path indications are as follows:



10.3 Reserved

10.4 Runway End Identifier Lights (REIL)

10.4.1 Runway End Identifier Lights are installed at many airfields to provide rapid and positive identification of the approach end of a particular runway. The system consists of a pair of synchronized flashing lights, one of which is located laterally on each side of the runway threshold facing the approach area. They are effective for:

A. Identification of a runway surrounded by a preponderance of other lighting.

B. Identification of a runway which lacks contrast with surrounding terrain.

C. Identification of a runway during reduced visibility.

10.5 Runway Edge Light Systems

10.5.1 Runway edge lights are used to outline the edges of runways during periods of darkness or restricted visibility conditions. These light systems are classified according to the intensity or brightness they are capable of producing; they are the High Intensity Runway Lights (HIRL), Medium Intensity Runway Lights (MIRL) and the Low Intensity Runway Lights (LIRL). The HIRL and MIRL systems have variable intensity controls, whereas the LIRL's normally have one intensity setting.

10.5.2 The runway edge lights are white except on instrument runways amber replaces white on the last 2,000 feet or half the runway length, whichever is less, to form a caution zone for landings. The lights marking the ends of the runway emit red light toward the runway to indicate the end of runway to a departing aircraft and emit green outward from the runway end to indicate the threshold to landing aircraft.

10.6 In-Runway Lighting

10.6.1 Touchdown zone lights and runway centerline lights are installed on some precision approach runways to facilitate landing under adverse visibility conditions. Taxiway turnoff lights may be added to expedite movement of aircraft from the runway.

10.6.1.1 Touchdown Zone Lighting (TDZL) — two rows of transverse light bars disposed symmetrically about the runway centerline in the runway touchdown zone. The system starts 100 feet from the landing threshold and extends to 3000 feet from the threshold or the midpoint of the runway, whichever is the lesser.

10.6.1.2 Runway Centerline Lighting (RCLS) — flush centerline lights spaced at 50-foot intervals beginning 75 feet from the landing threshold and extending to within 75 feet of opposite end. Viewed from the landing threshold, the runway centerline lights are white until the last 3,000 feet of the runway. The white lights begin to alternate with the red for the next 2,000 feet, and for the last 1,000 feet of the runway, all lights are red.

10.6.1.3 Taxiway turnoff lights — flush lights spaced at 50-foot intervals, defining the curved path of aircraft travel from the runway centerline to a point on the taxiway. These lights are steady burning and emit green light.

10.7 Control of Lighting Systems

10.7.1 Operation of approach light systems and runway lighting is controlled by the control tower (ATCT). At some locations the FSS may control the lights where there is no control tower in operation.

10.7.2 Pilots may request that lights be turned on or off. Runway edge lights, in-pavement lights and approach lights also have intensity controls which may be varied to meet the pilots request. Sequenced flashing lights may be turned on and off. Some sequenced flashing system also have intensity control.

10.8 Pilot Control of Airport Lighting

10.8.1 Radio control of lighting is available at selected airports to provide airborne control of lights by keying the aircraft's microphone. Control of lighting system is often available at locations without specified hours for lighting or where there is no control tower or FSS, or when the control tower or FSS is closed (locations with a part-time tower or FSS). All lighting systems which are radio controlled at an airport, whether on a single runway or multiple runways, operate on the same radio frequency.

10.8.2 With FAA approved systems, various combinations of medium intensity approach lights, runway lights, taxiways lights, VASI and/or REIL may be activated by radio control. On runways with both approach lighting and runway lighting (runway edge lights, taxiway lights, etc.) systems, the approach lighting system takes precedence for air-to-ground radio control over the runway lighting system which is set at a predetermined intensity step, based on expected visibility conditions. Runways without approach lighting may provide radio controlled intensity adjustments of runway edge lights. Other lighting systems, including VASI, REIL, and taxiway lights, may be either controlled with the runway edge lights or controlled independently of the runway edge lights.

10.8.3 The control system consists of a 3-step control responsive to 7, 5, and/or 3 microphone clicks. This 3-step control will turn on lighting facilities capable of either 3-step, 2-step or 1-step operation. The 3-step and 2-step lighting facilities can be altered in intensity, while the 1-step cannot. All lighting is illuminated for a period of 15 minutes from the most recent time of activation and may not be extinguished prior to end of the 15 minute period (except for 1-step and 2-step REIL's which may be turned off when desired by keying the mike 5 or 3 times, respectively.)

10.8.4 Suggested use is to always initially key the mike 7 times; this assures that all controlled lights are turned on to the maximum available intensity. If desired, adjustment can then be made, where the capability is provided, to a lower intensity (or the REIL turned off) by keying 5 and/or 3 times. Due to the close proximity of airports using the same frequency, radio controlled lighting receivers may be set at a low sensitivity requiring the aircraft to be relatively close to activate the system. Consequently, even when lights are on, always key mike as directed when overflying an airport of intended landing or just prior to entering the final segment of an approach. This will assure the aircraft is close enough to activate the system and a full 15 minutes lighting duration is available. Approved lighting systems may be activated by keying the mike (within 5 seconds) as indicated below:

RADIO CONTROL SYSTEM

Key Mike	*Function*
7 times within 5 seconds	Highest intensity available.
5 times within 5 seconds	Medium or lower intensity (Lower REIL or REIL-Off)
3 times within 5 seconds	Lowest intensity available (Lower REIL or REIL-Off)

10.8.5 For all public use airports with FAA standard systems the Airport/Facility Directory contains the types of lighting, runway and the frequency that is used to activate the system. Airports with instrument approach procedures include data on the approach chart identifying the light system(s), the runway on which they are installed, and the frequency that is used to activate the system(s).

Note. — Although the CTAF is used to activate the lights at many airports, other frequencies may also be used. The appropriate frequency for activating the lights on the airport is provided in the Airport/Facility Directory and the Standard Instrument Approach Procedures publications. It is not identified on the sectional charts.

10.8.6 Where the airport is not served by an instrument approach procedure, it may have either the standard FAA approach control system or an independent type system of different specification installed by the airport sponsor. The Airport/Facility Directory contains descriptions of pilot controlled lighting systems for each airport having other than FAA approved systems, and explains the type lights, method of control, and operating frequency in clear text. (See Appendix 2.)

10.9 Airport (Rotating) Beacon

10.9.1 The airport beacon has a vertical light distribution to make it most effective from one up to ten degrees above the horizon; however, it can be seen well above and below this peak spread. The beacon may be an omnidirection capacitor-discharge device, or, it may rotate at a constant speed which produces the visual effect of flashes at regular intervals. Flashes may be one or two colors alternately.

The total number of flashes are:

A. 12 to 30 per minute for beacons marking airports, landmarks, and points on Federal airways:

B. 30 to 60 per minute for beacons marking heliports;

C. 12 to 60 per minute for hazard beacons.

10.9.2 The colors and color combinations of rotating beacons and auxiliary lights are basically:

White and Green	Lighted land airport
*Green alone	Lighted land airport
White and Yellow	Lighted water airport
*Yellow alone	Lighted water airport
Red alone	Hazard
Green, Yellow, and White	Lighted heliport
White	Hazard

*Green alone or yellow alone is used only in connection with a white-and-green or white-and-yellow beacon display, respectively.

10.9.3 Military airport beacons flash alternately white and green, but are differentiated from civil beacons by dual-peaked (two quick) white flashes between the green flashes.

10.9.4 In Class B, C, D and E surface areas, operation of the airport beacon during the hours of daylight indicates that the ground visibility is less than 3 miles and/or the ceiling is less than 1,000 feet. An ATC clearance in accordance with FAR Part 91 is required for landing, takeoff and flight in the traffic pattern. Pilots should not rely solely on the operation of the airport beacon to indicate if weather conditions are IFR or VFR. At locations with control towers, when controls are in the tower, ATC personnel turn the beacon on. At many airports, the airport beacon is turned on by a photoelectric cell or time clocks and ATC personnel can not control it. There is no regulatory requirement for daylight operation and it is the pilot's responsibility to comply with proper pre-flight planning in accordance with FAR Part 91.103

10.10 TAXIWAY LIGHTS

10.10.1 Taxiway Edge Lights. — Taxiway edge lights are used to outline the edges of taxiways during periods of darkness or restricted visibility conditions. These fixtures emit blue light.

Note. — At most major airports these lights have variable intensity settings and may be adjusted at pilot request or when deemed necessary by the controller.

10.10.2 Taxiway Centerline Lights. — Taxiway centerline lights are used to facilitate ground traffic under low visibility conditions. They are located along the taxiway centerline in a straight line on straight portions, on the centerline of curved portions, and along designated taxiing paths in portions of runways, ramp, and apron areas. Taxiway centerline lights are steady burning and emit green light.

11. AIR NAVIGATION AND OBSTRUCTION LIGHTING

11.1 Aeronautical Light Beacons

11.1.1 An aeronautical light beacon is a visual NAVAID displaying flashes of white and/or colored light to indicate the location of an airport, a heliport, a landmark, a certain point of a Federal airway in mountainous terrain, or an obstruction. The light used may be a rotating beacon or one or more flashing lights. The flashing lights may be supplemented by steady burning lights of lesser intensity.

11.1.2 The color or color combination display by a particular beacon and/or its auxiliary lights tell whether the beacon is indicating a landing place, landmark, point of the Federal airways, or an obstruction. Coded flashes of the auxiliary lights, if employed, further identify the beacon site.

11.2 Code Beacons and Course Lights

11.2.1 Code Beacons

11.2.1.1 The code beacon, which can be seen from all directions, is used to identify airports and landmarks and to mark obstructions. The number of code beacon flashes are:

Green coded flashes not exceeding 40 flashes or character elements per minute, or constant flashes 12 to 15 per minute, for identifying land airports.

Yellow coded flashes not exceeding 40 flashes or character elements per minute, or constant flashes 12 to 15 per minute, for identifying water airports.

Red flashes, constant rate, 12 to 40 flashes per minute, for marking hazards.

11.2.2 Course Lights

11.2.2.1 The course light, which can be seen clearly from only one direction, is used only with rotating beacons of the Federal Airway System; two course lights, back to back, direct coded flashing beams of light in either direction along the course of airway.

Note. — Airway beacons are remnants of the "lighted" airways which antedated the present electronically equipped Federal Airways System. Only a few of those beacons exist today to mark airway segments in remote mountain areas. Flashes in Morse Code identify the beacon site.

11.3 Obstruction Beacon

11.3.1 Obstructions are marked/lighted to warn airmen of their presence during daytime and nighttime conditions. They may be marked/lighted in any of the following combinations:

Aviation Red Obstruction Lights. Flashing aviation red beacons and steady burning aviation red lights during nighttime operation. Aviation orange and white paint is used for daytime marking.

High Intensity White Obstruction Lights. Flashing high intensity white lights during daytime with reduced intensity for twilight and nighttime operation. When this type is used, the marking of structures with red obstruction lights and aviation orange and white paint may be omitted.

Dual Lighting.A combination of flashing aviation red beacons and steady burning aviation red lights for nighttime operations and flashing high intensity white lights for daytime operation. Aviation orange and white paint may be omitted.

11.3.2 High intensity flashing white lights are being used to identify some supporting structures of overhead transmission line located across rivers, chasms, gorges, etc. These lights flash in a middle, top, lower light sequence at approximately 60 flashes per minute. The top light is normally installed near the top of the supporting structure, while the lower light indicates the approximate lower portion of the wire span. The lights are beamed towards the companion structure to identify the area of the wire span.

11.3.3 High intensity flashing white lights are also employed to identify tall structures, such as chimneys and towers, and obstructions to air navigation. The lights provide a 360 degree coverage about the structure at 40 flashes per minute and consist of from one to seven levels of lights depending upon the height of the structure. Where more than one level is used the vertical banks flash simultaneously.

11.4 Airway Beacons

Airway beacons are remnants of the "lighted" airways which antedated the present electronically equipped Federal Airways System. Only a few of these beacons exist today to mark airway segments in remote mountain areas. Flashes in Morse Code identify the beacon site.

11.5 Airport Lead-in Lighting System (LDIN)

11.5.1 The lead-in lighting system consists of series of flashing lights installed at or near ground level to describe the desired course to a runway or final approach. Each group of lights is positioned and aimed so as to be conveniently sighted and followed from the approaching aircraft under conditions at or above approach minimums under consideration. The system may be curved, straight, or combination thereof, as required. The lead-in lighting system may be terminated at any approved approach lighting system, or it may be terminated at a distance from the landing threshold which is compatible with authorized visibility minimums permitting visual reference to the runway environment.

11.5.2 The outer portion uses groups of lights to mark segments of the approach path beginning at a point within easy visual range of a final approach fix. These groups are spaced close enough together (approximately one mile) to give continuous lead-in guidance. A group consists of at least three flashing lights in a linear or cluster configuration and may be augmented by steady burning lights where required. When practicable, groups flash in sequence toward runways. Each system is designed to suit local conditions and to provide the visual guidance intended. The design of all LDIN is compatible with the requirements of U.S. Standards for Terminal Instrument Procedures (TERPS) where such procedures are applied for establishing instrument minimums.

12. AIRPORT MARKING AIDS AND SIGNS

12.1 GENERAL

12.1.1 Airport marking aids and signs provide information that is useful to a pilot during landing, takeoff, and taxiing. The markings and signs described in this section reflect the FAA recommended standards.

12.1.2 Uniformity in airport marking and signs from one airport to another enhances safety and improves efficiency. Pilots are encouraged to work with the operators of the airports they use to achieve the marking and sign standards described in this section.

12.1.3 Pilots who encounter ineffective, incorrect, or confusing marking or signs on an airport should make the operator of the airport aware of the problem. These situations may also be reported under the Aviation Safety Reporting Program. (See SAR-4; SAFETY, HAZARD AND ACCIDENT REPORTS.) Pilots may also report these situations to the FAA regional airports division.

12.1.4 The FAA has issued revised standards on airport signs. The information contained in this section of the AIM is based upon these revised sign standards. Airports certificated under **Federal Aviation Regulation Part 139** are expected to be in compliance with the revised standards by January 1, 1994. Until that date, signs on these certificated airports may not be in accordance with the information provided herein. Airports not subject to certification under Part 139 may not be in compliance with these standards.

12.2 Airport Marking Aids

12.2.1 Markings for runways on airports and STOLports are white. Markings defining the landing area on a heliport are also white except for hospital heliports which use a red "H" on a white cross. Markings for taxiways, closed areas, hazardous areas, and holding positions (even if they are on a runway) are yellow.

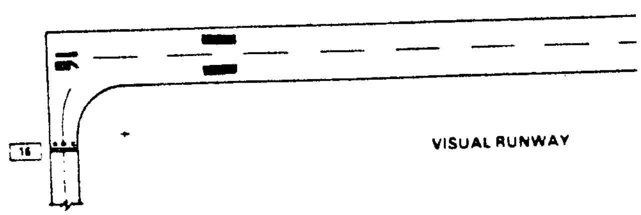
Note.— Detailed airport marking information is published in FAA Advisory Circular 150/5340-1, Marking of Paved Areas On Airports.

12.2.2 Runway Designators — Runway numbers and letters are determined from the approach direction. The number is the whole number nearest one-tenth the magnetic azimuth of the centerline of the runway, measured clockwise from the magnetic north.) The letter or letters differentiate between left, center or right for parallel runways:

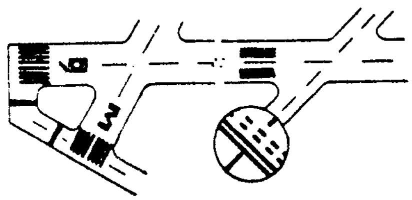
For two parallel runways "L" "R"

For three parallel runways "L" "C" "R"

12.2.3 Visual Runway Marking — Used for operations under Visual Flight Rules: centerline marking, designation marking, threshold marking on runways used or intended to be used by international commercial air transport, fixed distance marking (on runways 4,000 feet (1200M) or longer used by jet aircraft), holding position markings for taxiway/runway intersections, and holding position markings at runway/runway intersections when runways are normally used for "land, hold short operations" or taxiing.

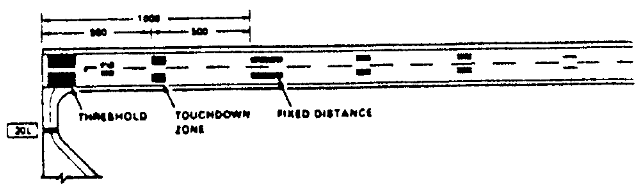


12.2.4 NonPrecision Instrument Runway Marking — Used on runways served by a nonvisual navigation aid and intended for landings under instrument weather conditions: centerline marking, designation marking, threshold marking, fixed distance marking (on runways 4,000 feet (1200M) or longer used by jet aircraft), holding position marking for taxiway/runway intersections and instrument landing system (ILS) critical areas, and holding position markings at runway/runway intersections when runways are normally used for "land, hold short operations" or taxiing.



NON-PRECISION INSTRUMENT RUNWAY

12.2.5 Precision Instrument Runway Marking — Used on runways served by nonvisual precision approach aids and on runways having special operational requirements: centerline marking, designation marking, threshold marking, fixed distance marking, touchdown zone marking, side stripes, holding position markings for taxiway/runway intersections and instrument landing system (ILS) critical areas, and holding position markings at runway/runway intersections when runways are normally used for "land, hold short operations" or taxiing.

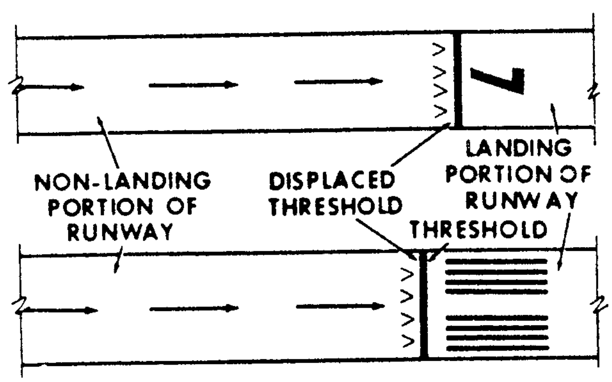


PRECISION INSTRUMENT RUNWAY

12.2.6 Threshold — The designated beginning of the runway that is available and suitable for the landing of aircraft.

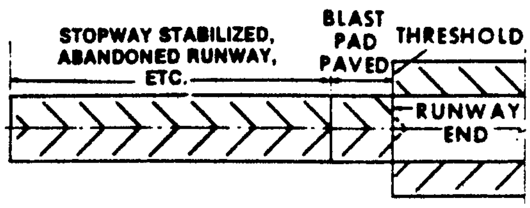
Note. — Sometimes constructionst or maintenance activities require the threshold to be relocated towards the departure end of the runway. In these cases, a NOTAM should be issued by the airport operator identifying the portion of the runway that is closed, e.g., First 2,000 feet of Runway 24 closed. Because the duration of the relocation can vary from a few hours to several months, methods for identifying the relocated threshold vary. One common practice is to use a ten feet wide white threshold bar across the width of the runway. Although the runway lights in the area between the old threshold and relocated threshold will not be illuminated, the runway markings in this area may or may not be obliterated, removed, or covered.

12.2.7 Displaced Threshold — A threshold located at a point on the runway other than the designated beginning of the runway. A ten feet white threshold bar is located across the width of the runway at the displaced threshold. White arrows are located along the centerline in the area between the beginning of the runway and displaced threshold. White arrow heads are located across the width of the runway just prior to the threshold bar.



PRECISION/NON-PRECISION RUNWAY

12.2.8 Paved Areas Beyond the Runway End — Any paved area beyond the runway end that is not intended to be use as a runway in the opposite direction or as a taxiway is marked with yellow chevrons across the width of the pavement. Blast pads, stopways, and abandoned sections of runway are marked in this manner.



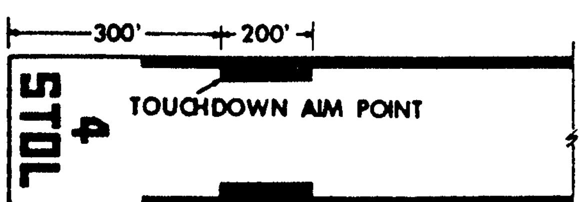
PAVED AREAS BEYOND THE RUNWAY END

12.2.9 Closed Runway — A runway which is unusable and may be hazardous even though it may appear usable.

CLOSED RUNWAY OR TAXIWAY

12.2.10 Fixed Distance Marking — The fixed distance marking identifies the aiming point for the pilot of a landing aircraft. The marking consists of a broad white stripe located on each side of the runway centerline approximately 1,000 feet from the landing threshold. (See Illustrations on Visual Runway, Non-Precision Instrument Runway, and Precision Instrument Runway.)

12.2.11 STOL (Short Take Off and Landing) Runway — In addition to the normal runway number marking, the letters STOL are painted on the approach end of the runway and a touchdown aim point is shown.



STOL RUNWAY

12.2.12 Taxiway Marking — The taxiway centerline is marked with a continuous yellow line. When the taxiway edge is marked, two continuous yellow lines spaced six inches apart.

12.2.13 Holding Position Markings — There are three types of holding position markings that may be encountered on an airport. The following is a description of each of these markings and their applications:

12.2.13.1 Holding Position Markings for Taxiway/Runway Intersections, Taxiways Located in Runway Approach Areas, and Runway/Runway Intersections consist of four yellow lines - two solid and two dashed, spaced six inches apart and extending across the width of the taxiway or runway. An example of a taxiway/runway intersection is shown in **Figure 2-22 [8]**. The solid lines are always on the side where the aircraft is to hold. These markings are installed on runways only if the runway is normally used by air traffic control for "land, hold short" operations or taxiing operations and have operational significance only for those two types of operations. A sign with a white inscription on a red background is installed adjacent to these holding position markings.

Note 1. - Yellow hold position markings are being placed on runways prior to the intersection with another runway, when the runway is normally used by air traffic control for taxiing aircraft or for "Land, Hold Short" operations. Pilots receiving instructions "Clear to Land, Runway XX" from Air Traffic Control are authorized to use the entire landing length of the runway and should disregard any holding position markings located on the runway. Pilots receiving and accepting instructions "Clear to Land Runway XX, Hold Short of Runway YY" from Air Traffic Control must either exit Runway XX prior to Runway YY or stop prior to Runway YY.

Note 2. - When instructed by ATC "HOLD SHORT OF (runway, or runway approach)" the pilot should stop so no part of his aircraft extends beyond the holding position marking. When approaching the holding position marking, a pilot should not cross the marking without ATC clearance at a controlled airport or without making sure of adequate separation from other aircraft at uncontrolled airports. An aircraft exiting a runway is not clear until all parts of the aircraft have crossed the applicable holding position marking.

12.2.13.2 Holding Position Markings for ILS Critical Areas consist of two yellow solid lines spaced two feet apart connected by pairs of solid lines spaced ten feet apart extending across the width of the taxiway as shown in **Figure 2-22 [8].** A sign with an inscription "ILS" in white on a red background is installed adjacent to these hold position markings.

Note. - When the ILS critical area is being protected (See Section COM-0) the pilot should stop so no part of his aircraft extends beyond the holding position marking. When approaching the holding position marking, a pilot should not cross the marking without ATC clearance. ILS critical area is not clear until all parts of the aircraft have crossed the applicable holding position marking.

1 CITY, STATE/AERODROME: **DALLAS-FT WORTH, TX/DALLAS-FORT WORTH INTERNATIONAL**

2 REFERENCE POINT:
Lat. 32°53'47.2''N, Long. 97°02'29.2''W.

3 DISTANCE AND DIRECTION FROM CITY:
12 NM NW.

4 ELEVATION:
603 ft (184 M)

5 AERODROME REFERENCE TEMPERATURE (CENTIGRADE):
35°C. (July).

6 MAGNETIC VARIATION:
07°E

7 TRANSITION ALTITUDE:

8 OPERATIONAL HOURS:
24 hours

9 AERODROME OPERATOR OR ADMINISTRATIVE AUTHORITY:
Cities of Dallas-Ft. Worth.

10 POSTAL ADDRESS:
P.O. Drawer DFW
Dallas-Fort Worth, TX 75261

11 TELEGRAPHIC ADDRESSES:
AFTN: KDFW

12 TELEPHONE NUMBERS:
214-574-3130

13 OVERNIGHT ACCOMMODATION:
Yes.

14 RESTAURANT ACCOMMODATION:
Yes.

15 MEDICAL FACILITIES:
Yes.

16 TRANSPORTATION AVAILABLE:
Taxis, busses, rental cars.

17 CARGO HANDLING FACILITIES:
Unlimited.

18 FUEL GRADES:
100LL, Jet A.

19 OIL GRADES:
Piston and turbine grades available.

20 OXYGEN AND RELATED SERVICING:
High pressure oxygen and high pressure replacement bottles.

21 REFUELING FACILITIES AND LIMITATIONS:
No.

22 HANGAR SPACE AVAILABLE FOR TRANSIENT AIRCRAFT:
No.

23 REPAIR FACILITIES AVAILABLE FOR TRANSIENT AIRCRAFT:
No.

24 CRASH EQUIPMENT:
ARFF Index E.

25 SEASONAL AVAILABILITY:
All seasons.

26 LOCAL FLYING RESTRICTIONS AND AERODROME REMARKS:
Landing fee. Prior permission required for itinerants to operate in central terminal area. Birds on and in vcnty of arpt.

27 PRE-FLIGHT ALTIMETER CHECK POINT(S):
None.

28 METEOROLOGICAL DATA

Mean daily maximum and minimum temperatures (C°)

Temperature	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Max (A)												
Min (B)												

Monthly mean pressure in (MB) at approximately the time of maximum (A) and minimum (B) temperatures

(A)												
(B)												

Monthly mean of the relative humidity at approximately the times of maximum (A) and minimum (B) temperatures

(A)												
(B)												

29 SLOPE (GRADIENT): See diagram.

CONTINUED — **DALLAS-FT WORTH, TX/DALLAS-FORT WORTH INTERNATIONAL**

30 PHYSICAL CHARACTERISTICS

Runway			Declared Distances				THR ELEV (ft)	Stopway (m)	Clearway (m)	PCN	Runway Surface	Stopway Surface
Designation	True BRG	Length/Width (m)	TORA (m)	TODA (m)	ASDA (m)	LDA (m)						
a	b	c	d	e	f	g	h	i	k	l	m	n
13L 31R	135°16' 315°16'	2743 x 60	2743 2743	2743 2743	2743 2743	2743 2743	553 508	- -	- -	60/R/B/X/U	CONC- Grooved	- -
13R 31L	139°03' 319°03'	2835 x 45	2835 2835	2835 2835	2835 2835	2835 2835	591 577	- -	- -	-	CONC- Grooved	- -
17L 35R	180°15' 00°15'	3471 x 45	3471 3471	3471 3471	3471 3471	3471 3471	563 562	- -	- -	60/R/B/X/U	CONC- Grooved	- -
17R 35L	180°16' 00°16'	4084 x 60	4084 4084	4084 4084	4084 4084	4084 4084	567 563	- -	- -	60/R/B/X/U	CONC- Grooved	- -
18L 36R	180°15' 00°15'	3471 x 60	3471 3471	3471 3471	3471 3471	3471 3471	596 575	- -	- -	60/R/B/X/U	CONC- Grooved	- -
18R 36L	180°15' 00°15'	3471 x 45	3471 3471	3471 3471	3471 3471	3471 3471	603 582	- -	- -	60/R/B/X/U	CONC- Grooved	- -
18S 36S	180°15' 00°15'	1219 x 30	1219 1219	1219 1219	1219 1219	1219 1219	578 573	- -	- -	60/R/B/X/U	CONC	- -

Landing Area Remarks: High speed exits Rwys 17L, 17R, 31R, 35L, 35R. Rwys 18S/36S restricted to propeller acft 12,500 lbs (5 670) or less, STOL, and VFR daylight plus IFR dep. 160 ft (49) wide grooving on Rwys 13L/31R, 18L/36R, 17R/35L; 130 ft (40) wide on Rwys 17L/35R, 18R/36L, 13R/31L.

31 MOVEMENT AREAS

APRONS: Concrete. TAXIWAYS: Concrete. HELICOPTER ALIGHTING AREA: Yes.

VISUAL GROUND AREAS

32 TAXIING GUIDANCE SYSTEM: Blue taxiway lights.

33 VISUAL AIDS TO LOCATION: Rotating beacon—alternating white and green.

34 INDICATORS AND GROUND SIGNALLING DEVICES: Wind indicator—lighted.

35 LIGHTING AIDS

APPROACH LIGHTS: Rwys 17L, 18R—ALSF2. Rwys 13R, 17R, 18L, 31R, 35R, 36L, 36R—MALSR.
RVR: Rwys 18L, 36R, 17R, 35L, 18R, 36L, 17L, 35R, 13R.
VASI: Rwys 13L, 35L, 36R, 17R.
RUNWAY LIGHTS: All—white high intensity, except Rwy 18S/36S unlighted. Touchdown zone—Rwys 13R/31L, 13L/31R, 17R/35L, 17L/35R, 18R/36L, 18L/36R. Runway centerline—Rwys 13R/31L, 13L/31R, 18L/36R, 17R/35L, 17L/35R, 18R/36L.

36 EMERGENCY LIGHTING AND SECONDARY POWER SUPPLY: Yes.

37 OBSTRUCTION MARKING AND LIGHTING:

38 MARKING AIDS: Runway centerline and sidestripes, numbers, thresholds, touchdown, and fixed distance markings. Taxiway centerline and taxiway hold markings.

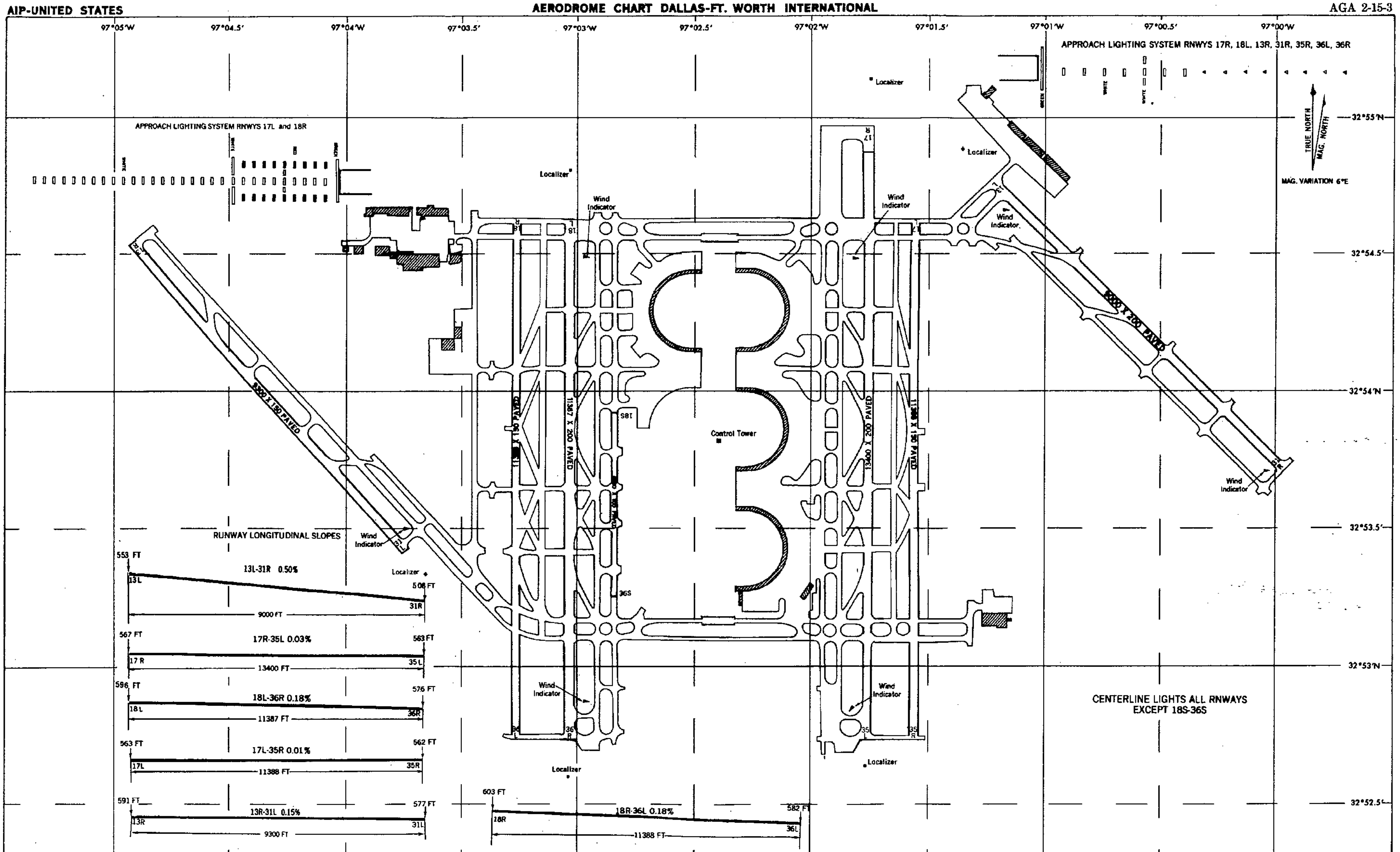
39 OBSTRUCTION IN APPROACH AND TAKE-OFF AREAS

Runway Identification	13L	31R	17L	35R	17R	35L	18S	36S	18L	36R	18R	36L	13R	31L
Controlling Obstruction														
Obstn Clnc Slope	50:1	50:1	50:1	50:1	50:1	50:1	50:1	50:1	50:1	50:1	50:1	50:1		
Dist from Runway End														

Obstruction Remarks: None.

41 DISABLED AIRCRAFT REMOVAL CAPABILITY: Yes, B-747

AERODROME CHART DALLAS-FT. WORTH INTERNATIONAL



1 CITY, STATE/AERODROME: **DENVER, CO/DENVER INTERNATIONAL.**

2 REFERENCE POINT:
Lat. 39°51'30.3''N, Long. 104°40'01.2''W.

3 DISTANCE AND DIRECTION FROM CITY:
16 NM NE.

4 ELEVATION:
5431 FT (1655).

5 AERODROME REFERENCE TEMPERATURE (CENTIGRADE):
31°C (July).

6 MAGNETIC VARIATION:
11°E.

7 TRANSITION ALTITUDE:

8 OPERATIONAL HOURS:
24 hours.

9 AERODROME OPERATOR OR ADMINISTRATIVE AUTHORITY:
City & County of Denver.

10 POSTAL ADDRESS:
Admin Bldg.
8400 Pena Blvd.
Denver, CO 80249

11 TELEGRAPHIC ADDRESSES:
AFTN: KDEN

12 TELEPHONE NUMBERS:
303-342-2200

13 OVERNIGHT ACCOMMODATION:

14 RESTAURANT ACCOMMODATION:

15 MEDICAL FACILITIES:

16 TRANSPORTATION AVAILABLE:

17 CARGO HANDLING FACILITIES:

18 FUEL GRADES:
100LL, 100, MOGAS.

19 OIL GRADES:
Piston and turbine grades available.

20 OXYGEN AND RELATED SERVICING:
High pressure oxygen and replacement bottles.

21 REFUELING FACILITIES AND LIMITATIONS:
No.

22 HANGAR SPACE AVAILABLE FOR TRANSIENT AIRCRAFT:
Yes.

23 REPAIR FACILITIES AVAILABLE FOR TRANSIENT AIRCRAFT:
Major airframe and powerplant.

24 CRASH EQUIPMENT:

25 SEASONAL AVAILABILITY:
All seasons.

26 LOCAL FLYING RESTRICTIONS AND AERODROME REMARKS:
LDG fee.

27 PRE-FLIGHT ALTIMETER CHECK POINT(S):
None.

28 METEOROLOGICAL DATA

Mean daily maximum and minimum temperatures (C°)

Temperature	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Max (A)	6	8	10	16	21	21	31	30	25	19	12	8
Min (B)	-9	-7	-5	1	6	11	15	14	9	3	-4	-7
Monthly mean pressure in (MB) at approximately the time of maximum (A) and minimum (B) temperatures												
(A)	1015	1014	1012	1009	1009	1009	1012	1012	1012	1014	1016	1015
(B)	1016	1015	1013	1011	1012	1011	1013	1013	1014	1016	1016	1015
Monthly mean of the relative humidity at approximately the times of maximum (A) and minimum (B) temperatures												
(A)	48	43	41	34	37	36	36	34	37	36	50	51
(B)	63	66	68	69	70	71	70	69	71	65	69	65

29 SLOPE (GRADIENT): See diagram.

CONTINUED — **DENVER, CO/DENVER INTERNATIONAL.**

30 PHYSICAL CHARACTERISTICS

Runway			Declared Distances				THR ELEV (ft)	Stopway (m)	Clearway (m)	PCN	Runway Surface	Stopway Surface
Designa-tion	True BRG	Length/Width (m)	TORA (m)	TODA (m)	ASDA (m)	LDA (m)						
a	b	c	d	e	f	g	h	i	k	l	m	n
07 25	20°29' 270°29'	3658 x 45	3658 3658	3658 3658	3658 3658	3658 3658	5347 5352	- -	- -	76/R/C/W/T	CONC- Grooved	- -
08 26	90°32' 270°32'	3658 x 45	3658 3658	3658 3658	3658 3658	3658 3658	5351 5291	- -	- -	76/R/C/W/T	CONC- Grooved	- -
16 34	180°31' 0°31'	3658 x 45	3658 3658	3658 3658	3658 3658	3658 3658	5347 5351	- -	- -	76/R/C/W/T	CONC- Grooved	- -
17L 35R	180°33' 0°33'	3658 x 45	3658 3658	3658 3658	3658 3658	3658 3658	5325 5367	- -	- -	76/R/C/W/T	CONC- Grooved	- -
17R 35L	180°32' 0°32'	3658 x 45	3658 3658	3658 3658	3658 3658	3658 3658	5374 5431	- -	- -	76/R/C/W/T	CONC- Grooved	- -

Landing Area Remarks: None.

31 MOVEMENT AREAS

APRONS: ASPH. TAXIWAYS: ASPH. HELICOPTER ALIGHTING AREA: No.

VISUAL GROUND AREAS

32 TAXIING GUIDANCE SYSTEM: B TWY LGTS on primary TWYS.

33 VISUAL AIDS TO LOCATION: Rotating BCN—ALTN W and G.

34 INDICATORS AND GROUND SIGNALLING DEVICES: Wind Indicator - LGTD.

35 LIGHTING AIDS

APPROACH LIGHTS: RWY 34, 35R, 35L—ALSF2; RWYS 07, 08, 16, 17L, 17R, 25, 26—MALSR.
RVR: RWYS 07, 08, 16, 17L, 17R, 25, 26, 34, 35R, 35L.
RVV: RWYS 07, 08, 16, 17L, 17R, 25, 26, 34, 35R, 35L.
REIL: None.
VASI: RWYS 07, 08, 16, 17L, 17R, 25, 26, 34, 35R, 35L.
RUNWAY LIGHTS: ALL RWYS HIGH INTST; ALL RWYS CL LGTS; TDZ—RWYS 07, 26, 16, 34, 35R, 17R, 35L.

36 EMERGENCY LIGHTING AND SECONDARY POWER SUPPLY: Yes.

37 OBSTRUCTION MARKING AND LIGHTING: R obstruction LGTS—day and NGT.

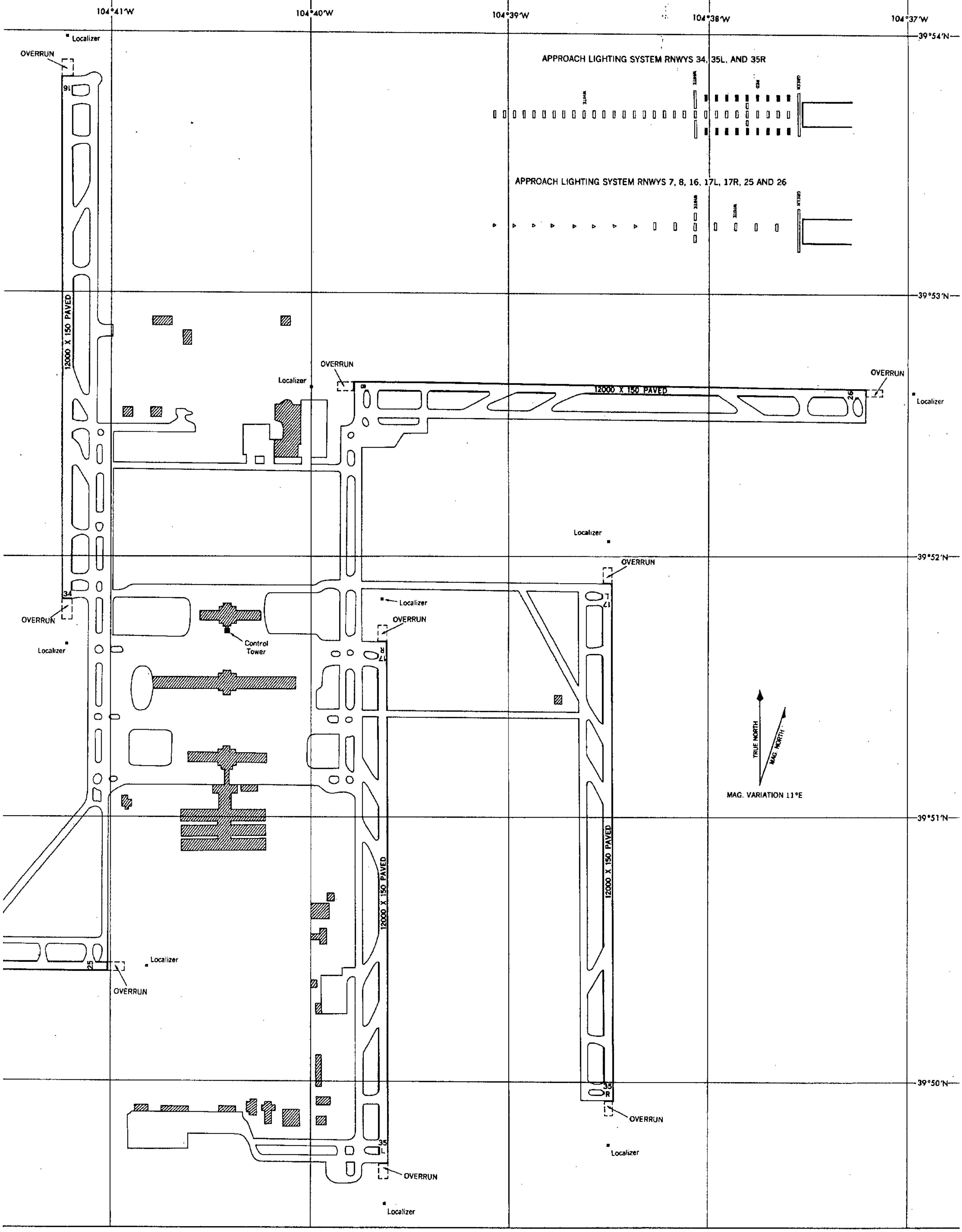
38 MARKING AIDS: RWY CL and sidestripes, numerals, THR and touchdown markings. TWY hold lines.

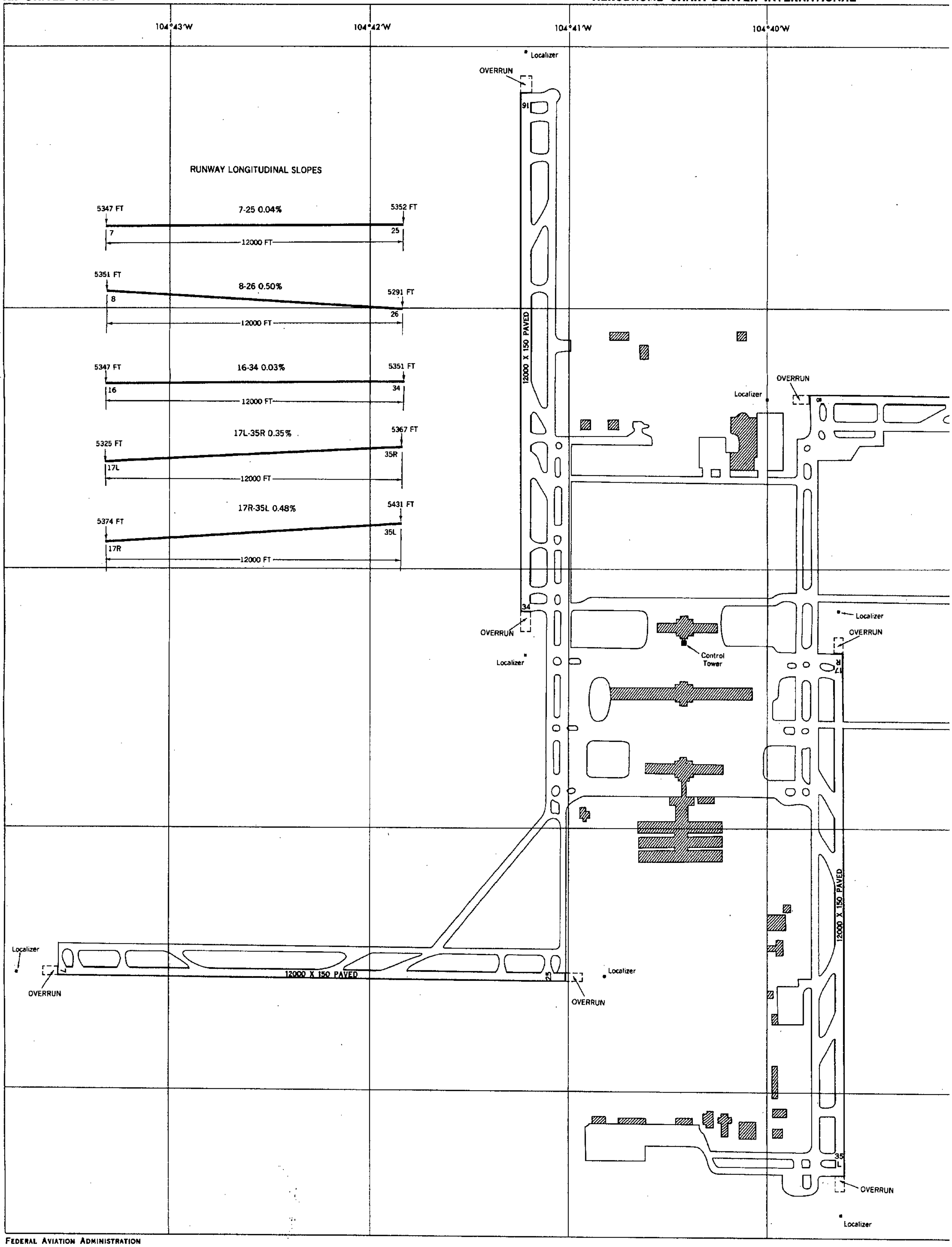
39 OBSTRUCTION IN APPROACH AND TAKE-OFF AREAS

Runway Identification	07	25	08	26	16	34	17L	35R	17R	35L
Controlling Obstruction										
Obstn Clnc Slope	50:1	50:1	50:1	50:1	50:1	50:1	50:1	50:1	50:1	50:1
Dist from Runway End										

Obstruction Remarks: None.

41 DISABLED AIRCRAFT REMOVAL CAPABILITY: NONE.


104°41'W
104°40'W
104°39'W
104°38'W
104°37'W
39°54'N
39°53'N
39°52'N
39°51'N
39°50'N
APPROACH LIGHTING SYSTEM RNWYS 34, 35L, AND 35R
APPROACH LIGHTING SYSTEM RNWYS 7, 8, 16, 17L, 17R, 25 AND 26
Localizer
OVERRUN
12000 X 150 PAVED
16
34
8
26
17L
17R
25
35L
35R
Control Tower
TRUE NORTH
MAG. NORTH
MAG. VARIATION 11°E


104°43'W
104°42'W
104°41'W
104°40'W
RUNWAY LONGITUDINAL SLOPES
5347 FT
7-25 0.04%
5352 FT
7
25
12000 FT
5351 FT
8-26 0.50%
5291 FT
8
26
12000 FT
5347 FT
16-34 0.03%
5351 FT
16
34
12000 FT
17L-35R 0.35%
5367 FT
5325 FT
35R
17L
12000 FT
17R-35L 0.48%
5431 FT
5374 FT
35L
17R
12000 FT
Localizer
OVERRUN
16
12000 X 150 PAVED
34
Control Tower
17R
25
35L
8

1 CITY, STATE/AERODROME: **EVERETT, WA/SNOHOMISH COUNTY (PAINE FIELD)** [ALTERNATE]

2 REFERENCE POINT:
Lat. 47°54'27.5"N, Long. 122°16'54"W.

3 DISTANCE AND DIRECTION FROM CITY:
6 NM SW.

4 ELEVATION:
606 FT (185 M).

5 AERODROME REFERENCE TEMPERATURE (CENTIGRADE):
17°C. (July).

6 MAGNETIC VARIATION:
21°E.

7 TRANSITION ALTITUDE:

8 OPERATIONAL HOURS:
Mon-Fri 0700-2100; Sat-Sun 0800-2000.

9 AERODROME OPERATOR OR ADMINISTRATIVE AUTHORITY:
Snohomish County.

10 POSTAL ADDRESS:
Airport Manager
3220 100th Street, SW
Everett, Washington 98204

11 TELEGRAPHIC ADDRESSES:
AFTN: KPAE

12 TELEPHONE NUMBERS:
206-353-2110

13 OVERNIGHT ACCOMMODATION:
Yes.

14 RESTAURANT ACCOMMODATION:
Yes.

15 MEDICAL FACILITIES:
Yes.

16 TRANSPORTATION AVAILABLE:
Yes.

17 CARGO HANDLING FACILITIES:
None.

18 FUEL GRADES:
80, 100, Jet A.

19 OIL GRADES:
Limited piston and turbine grades available.

20 OXYGEN AND RELATED SERVICING:
High pressure oxygen.

21 REFUELING FACILITIES AND LIMITATIONS:
Fuel after hours 206-355-6600.

22 HANGAR SPACE AVAILABLE FOR TRANSIENT AIRCRAFT:
No.

23 REPAIR FACILITIES AVAILABLE FOR TRANSIENT AIRCRAFT:
Major airframe and powerplant.

24 CRASH EQUIPMENT:
ARFF Index A, U.

25 SEASONAL AVAILABILITY:
All seasons.

26 LOCAL FLYING RESTRICTIONS AND AERODROME REMARKS:
Arpt clsd ACR opns 2100-0700 excp with PPR. Fee for acft over 30,000 LB (13 605). When ATCT clsd, Rwy 34L left tfc for acft 12,500 lbs GWT, and Military helicopter opns unable to communicate on VHF. Noise sensitive arpt. Acft ovr 250 HP should request Rwy 16R/34L. Birds in vcnty of arpt.

27 PRE-FLIGHT ALTIMETER CHECK POINT(S):
None.

28 METEOROLOGICAL DATA

Mean daily maximum and minimum temperatures (C°)

Temperature	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Max (A)	6	8	9	13	16	19	22	21	19	14	9	7
Min (B)	0	2	2	4	7	9	11	12	10	7	4	2

Monthly mean pressure in (MB) at approximately the time of maximum (A) and minimum (B) temperatures

(A)												
(B)												

Monthly mean of the relative humidity at approximately the times of maximum (A) and minimum (B) temperatures

(A)	78	76	68	64	64	67	62	65	66	73	77	82
(B)	87	88	86	85	84	85	84	88	90	90	88	89

29 SLOPE (GRADIENT): See diagram.

CONTINUED — **EVERETT, WA/SNOHOMISH COUNTY (PAINE FIELD)** [ALTERNATE]

30 PHYSICAL CHARACTERISTICS

Runway			Declared Distances				THR ELEV (ft)	Stopway (m)	Clearway (m)	PCN	Runway Surface	Stopway Surface
Designation	True BRG	Length/Width (m)	TORA (m)	TODA (m)	ASDA (m)	LDA (m)						
a	b	c	d	e	f	g	h	i	k	l	m	n
11 29	134°08' 314°08'	1376 x 23	1376 1376	1376 1376	1376 1376	1132 1376	572 600	- -	- -	33/F/B/X/T	ASPH	- -
16L 34R	179°34' 359°34'	914 x 23	914 914	914 914	914 914	914 914	597 596	- -	- -	-	ASPH-Grooved	- -
16R 34L	179°08' 359°08'	2746 x 45	2746 2746	2746 2746	2746 2746	2746 2746	554 573	- -	- -	71/F/B/X/T	ASPH-CONC	- -

Landing Area Remarks: Rwys 11/29, 16L/34R clsd when ATCT clsd and, clsd to acft over 250 horsepower unless directed by ATC. Rwy 11 thr dsplcd 799 FT (244).

31 MOVEMENT AREAS

APRONS: ASPH. TAXIWAYS: ASPH. HELICOPTER ALIGHTING AREA: Yes.

VISUAL GROUND AREAS

32 TAXIING GUIDANCE SYSTEM: B TWY LGTS.

33 VISUAL AIDS TO LOCATION: Rotating BCN—ALTN W and G.

34 INDICATORS AND GROUND SIGNALLING DEVICES: None.

35 LIGHTING AIDS

APPROACH LIGHTS: RWY 16R—MALSR, RWY 34L—ODALS, activate on 121.3 when TWR CLSD.
RVR: 16R.
VASI: RWYS 34L, 11, 29.
REIL: RWYS 16L, 34R.
THRESHOLD LIGHTS: None.
RUNWAY LIGHTS: RWYS 11/29, 16L/34R—medium INTST. RWY 16R/34L—high INTST.

36 EMERGENCY LIGHTING AND SECONDARY POWER SUPPLY: No.

37 OBSTRUCTION MARKING AND LIGHTING:

38 MARKING AIDS: RWY CL and sidestripes, numerals, THR, touchdown, and TWY hold markings. Rwy 34L side stripes at 150 feet, full 200 feet usable, rwy lgts at 200 feet.

39 OBSTRUCTION IN APPROACH AND TAKE-OFF AREAS

Runway Identification	11	29	16R	34L	16L	34R
Controlling Obstruction	Trees	Trees		Trees		Pole
Obstn Clnc Slope	0:1	23:1	50:1	30:1	22:1	19:1
Dist from Runway End	200 (61)	1,300 (396)		4,000 (1219)		690 (210)

Obstruction Remarks: APCH ratio to displaced THR RWY 11—28:1.

41 DISABLED AIRCRAFT REMOVAL CAPABILITY: Yes, B-707

1 CITY, STATE/AERODROME: **GUAM, MARIANA ISLANDS/ANDERSEN AIR FORCE BASE** [ALTERNATE]

2 REFERENCE POINT:
Lat. 13°34'52''N., Long. 144°55'28''E.

3 DISTANCE AND DIRECTION FROM CITY:
Adjacent north.

4 ELEVATION:
612 ft (187 M)

5 AERODROME REFERENCE TEMPERATURE (CENTIGRADE):
30°C. (June).

6 MAGNETIC VARIATION:
2°E.

7 TRANSITION ALTITUDE:

8 OPERATIONAL HOURS:
24 hours.

9 AERODROME OPERATOR OR ADMINISTRATIVE AUTHORITY:
U.S. Air Force.

10 POSTAL ADDRESS:
Commanding Officer
Andersen AFB
Guam, Mariana Islands 69912

11 TELEGRAPHIC ADDRESSES:
AFTN: PGUA

12 TELEPHONE NUMBERS:

13 OVERNIGHT ACCOMMODATION:
Limited.

14 RESTAURANT ACCOMMODATION:
Limited.

15 MEDICAL FACILITIES:
Limited.

16 TRANSPORTATION AVAILABLE:
Limited.

17 CARGO HANDLING FACILITIES:
Limited.

18 FUEL GRADES:
None.

19 OIL GRADES:
None.

20 OXYGEN AND RELATED SERVICING:
Low pressure oxygen.

21 REFUELING FACILITIES AND LIMITATIONS:
None.

22 HANGAR SPACE AVAILABLE FOR TRANSIENT AIRCRAFT:
Yes.

23 REPAIR FACILITIES AVAILABLE FOR TRANSIENT AIRCRAFT:
No.

24 CRASH EQUIPMENT:
ARFF Index L.

25 SEASONAL AVAILABILITY:
All seasons.

26 LOCAL FLYING RESTRICTIONS AND AERODROME REMARKS:
Right traffic Rwys 24L and 24R.

27 PRE-FLIGHT ALTIMETER CHECK POINT(S):
None.

28 METEOROLOGICAL DATA

Mean daily maximum and minimum temperatures (C°)

Temperature	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Max (A)	27	28	28	29	29	30	30	29	29	29	30	29
Min (B)	24	24	24	25	25	25	25	25	25	25	25	25

Monthly mean pressure in (MB) at approximately the time of maximum (A) and minimum (B) temperatures

(A)
(B)

Monthly mean of the relative humidity at approximately the times of maximum (A) and minimum (B) temperatures

(A)
(B)

29 SLOPE (GRADIENT): See diagram.

CONTINUED — **GUAM, MARIANA ISLANDS/ANDERSEN AIR FORCE BASE [ALTERNATE]**

30 PHYSICAL CHARACTERISTICS

Runway			Declared Distances				THR ELEV (ft)	Stopway (m)	Clearway (m)	PCN	Runway Surface	Stopway Surface
Designation	True BRG	Length/Width (m)	TORA (m)	TODA (m)	ASDA (m)	LDA (m)						
a	b	c	d	e	f	g	h	i	k	l	m	n
06L 24R	66°00' 246°00'	3217 x 60	3217 3217	3217 3217	3217 3217	3217 3217	534 624	- -	- -	-	ASPH- CONC	- -
06R 24L	65°54' 245°54'	3414 x 60	3414 3414	3414 3414	3414 3414	3414 3414	550 606	- -	- -	-	ASPH- CONC	- -

Landing Area Remarks: Rwy 24R thr displaced 645 ft (197). High speed exit Rwys 06L/24R, 06R/24L.

31 MOVEMENT AREAS

APRONS: Asphalt
TAXIWAYS: Asphalt.
HELICOPTER ALIGHTING AREA: Yes.

VISUAL GROUND AREAS

32 TAXIING GUIDANCE SYSTEM:
Blue taxiway lights.

33 VISUAL AIDS TO LOCATION:
Rotating beacon—alternating white and green.

34 INDICATORS AND GROUND SIGNALLING DEVICES:
Wind indicator.

35 LIGHTING AIDS

APPROACH LIGHTS: Rwys 06L, 06R, 24R—MALS. Rwy 24L—SALS.
RVV: Rwys 06L, 06R, 24L, 24R.
RVR: Rwys 06L, 06R, 24L, 24R.
REILS: Rwys 06L, 24R, 06R, 24L.
VASI: Rwys 06L, 24R, 06R, 24L.
THRESHOLD LIGHTS:
RUNWAY LIGHTS: Rwys 06L/24R, 06R/24L—white high intensity. Touchdown zone—Rwys 06L, 06R, 24L, 24R.

36 EMERGENCY LIGHTING AND SECONDARY POWER SUPPLY:
Yes.

37 OBSTRUCTION MARKING AND LIGHTING:
Red obstruction lights—day and night.

38 MARKING AIDS:
Runway centerline, sidestripes, numerals, threshold markings.

39 OBSTRUCTION IN APPROACH AND TAKE-OFF AREAS

Runway Identification	06R	24L	06L	24R
Controlling Obstruction	Tower			
Obstn Clnc Slope	50:1	50:1	50:1	50:1
Dist from Runway End	4,432 (1 352)			

Obstruction Remarks: None.

41 DISABLED AIRCRAFT REMOVAL CAPABILITY:
Yes, B-747/C5A

1 City, State/Aerodrome: KANSAS CITY, MO/KANSAS CITY INTERNATIONAL

2 Reference Point:
Lat. 39°17'57.2''N, Long. 94°43'04.7''W.

3 Distance and Direction from City:
15 NM NW.

4 Elevation:
1,026 ft (313 M)

5 Aerodrome Reference Temperature (Centigrade):
31°C. (July).

6 Magnetic Variation:
05°E.

7 Transition Altitude:

8 Operational Hours:
24 hours.

9 Aerodrome Operator or Administrative Authority:
City of Kansas City.

10 Postal Address:
Kansas City International Airport
1 International Square
PO Box 20047
Kansas City, MO 64195

11 Telegraphic Addresses:
AFTN: KMCI

12 Telephone Numbers:
816-243-5259

13 Overnight Accommodation:
Yes.

14 Restaurant Accommodation:
Yes.

15 Medical Facilities:
Yes.

16 Transportation Available:
Taxis, busses, rental cars.

17 Cargo Handling Facilities:
Yes.

18 Fuel Grades:
100LL, Jet A.

19 Oil Grades:
None.

20 Oxygen and Related Servicing:
No.

21 Refueling Facilities and Limitations:
None.

22 Hangar Space Available for Transient Aircraft:
No.

23 Repair Facilities Available for Transient Aircraft:
No.

24 Crash Equipment:
ARFF Index C.

25 Seasonal Availability:
All seasons.

26 Local Flying Restrictions and Aerodrome Remarks:
Rigt tfc Rwys 19R, 27. Ldg fee. Birds in vcnty of arpt. Military acft may be charged ramp/parking fees and parking overnight. Prior approval to park at airline gate areas.

27 Pre-Flight Altimeter Check Point(s):
None.

28 Meteorological Data

Mean daily maximum and minimum temperatures (C°)

Temperature	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Max (A)	2	6	10	18	24	28	31	30	26	21	12	5
Min (B)	-7	-4	0	7	13	18	21	20	15	9	1	-4

Monthly mean pressure in (MB) at approximately the time of maximum (A) and minimum (B) temperatures

	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
(A)	1020	1019	1015	1013	1012	1012	1013	1014	1015	1016	1018	1019
(B)	1021	1019	1016	1014	1014	1013	1015	1015	1016	1017	1018	1120

Monthly mean of the relative humidity at approximately the times of maximum (A) and minimum (B) temperatures

	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
(A)	64	61	61	55	55	55	47	54	62	60	64	67
(B)	73	74	79	76	82	82	79	84	86	81	79	77

29 Slope (Gradient): See diagram.

CONTINUED — **KANSAS CITY, MO/KANSAS CITY INTERNATIONAL**

30 PHYSICAL CHARACTERISTICS

Runway			Declared Distances				THR ELEV (ft)	Stopway (m)	Clearway (m)	PCN	Runway Surface	Stopway Surface
Designation	True BRG	Length/Width (m)	TORA (m)	TODA (m)	ASDA (m)	LDA (m)						
a	b	c	d	e	f	g	h	i	k	l	m	n
01L 19R	12°56' 192°56'	3292 x 45	3292 3292	3292 3292	3292 3292	3292 3292	1011 977	- -	- -	62/F/B/W/T	ASPH-Grooved	- -
01R 19L	12°56' 192°56'	2893 x 45	2893 2893	2893 2893	2893 2893	2893 2893	977 1017	- -	- -	75/R/B/W/T	CONC-Grooved	- -
09 27	96°07' 276°07'	2896 x 45	2896 2896	2896 2896	2896 2896	2896 2896	1014 1026	- -	- -	30/F/B/W/T	ASPH-Grooved	- -

Landing Area Remarks: High speed twys A4, A6, A8, C2, C6, and C7 grooved within 10 feet (3) of both edges. When using high speed exits C3, C5, and C6, continue until first parallel taxiway, then use extreme caution when turning in excess of 90 degrees. High speed exits Rwys 01L, 19R, 09, 27.

31 MOVEMENT AREAS

APRONS: Asphalt.
TAXIWAYS: Asphalt.
HELICOPTER ALIGHTING AREA: None.

VISUAL GROUND AREAS

32 TAXIING GUIDANCE SYSTEM:
Blue taxiway lights all taxiways.

33 VISUAL AIDS TO LOCATION:
Rotating beacon—alternating white and green.

34 INDICATORS AND GROUND SIGNALLING DEVICES:
Wind indicator—lgtd, and Windshear Alert System on arpt.

35 LIGHTING AIDS

APPROACH LIGHTS: Rwy 19R—ALSF2. Rwys 01L, 09, 27—MALSR.
RVR: Rwy 01L, 09, 19R, 27.
REILS: Rwy 27.
VASI: Rwy 27.
THRESHOLD LIGHTS:
RUNWAY LIGHTS: High intensity all Rwys. Centerline—Rwys 01L/19R, 09/27. Touchdown zones—Rwys 01L, 19R, 09.

36 EMERGENCY LIGHTING AND SECONDARY POWER SUPPLY:
Yes.

37 OBSTRUCTION MARKING AND LIGHTING:
Red obstruction lights—day and night.

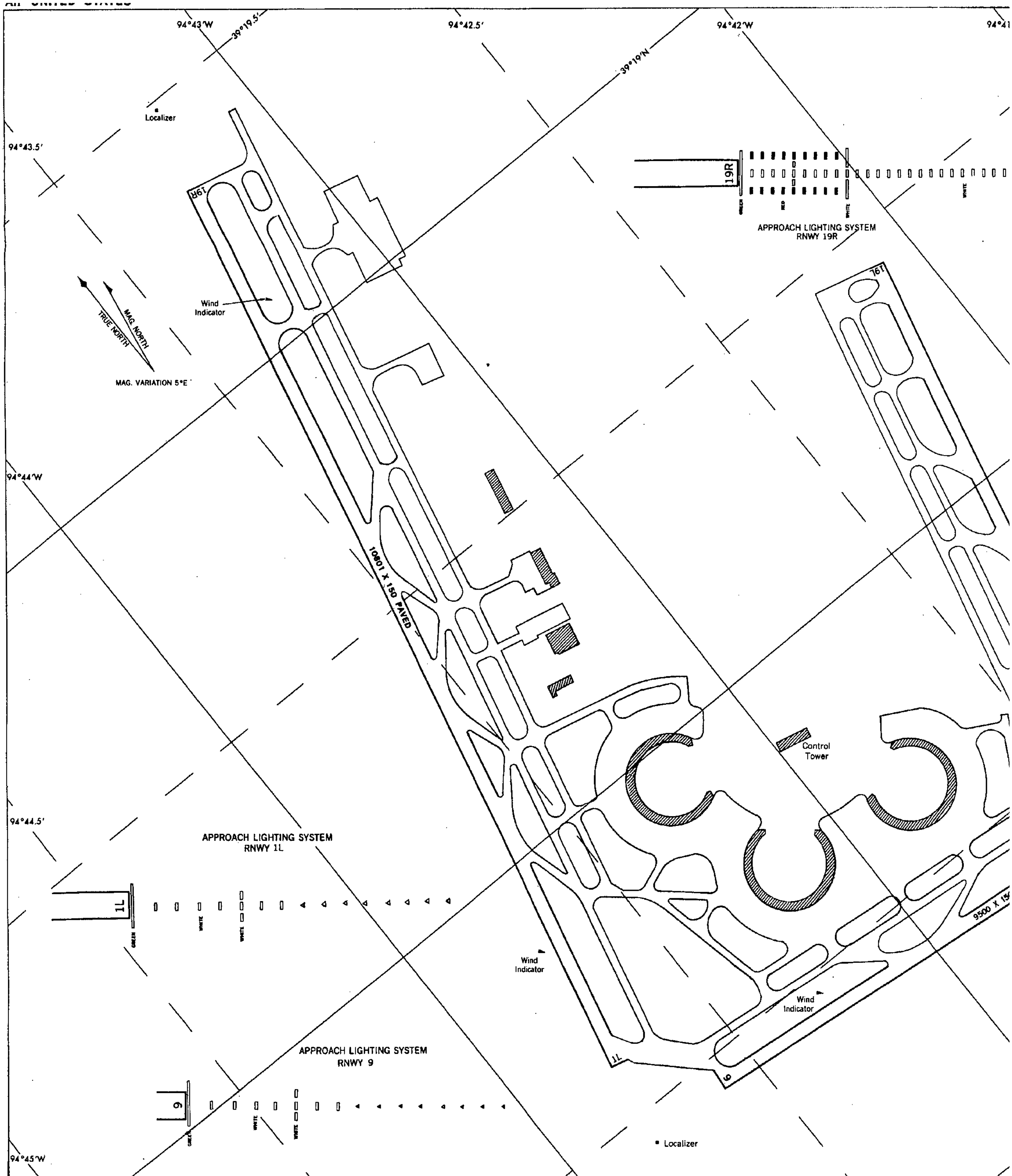
38 MARKING AIDS:
Runway centerline, sidestripes, numerals, threshold, and touchdown markings. Taxiway and taxiway hold markings.

39 OBSTRUCTION IN APPROACH AND TAKE-OFF AREAS

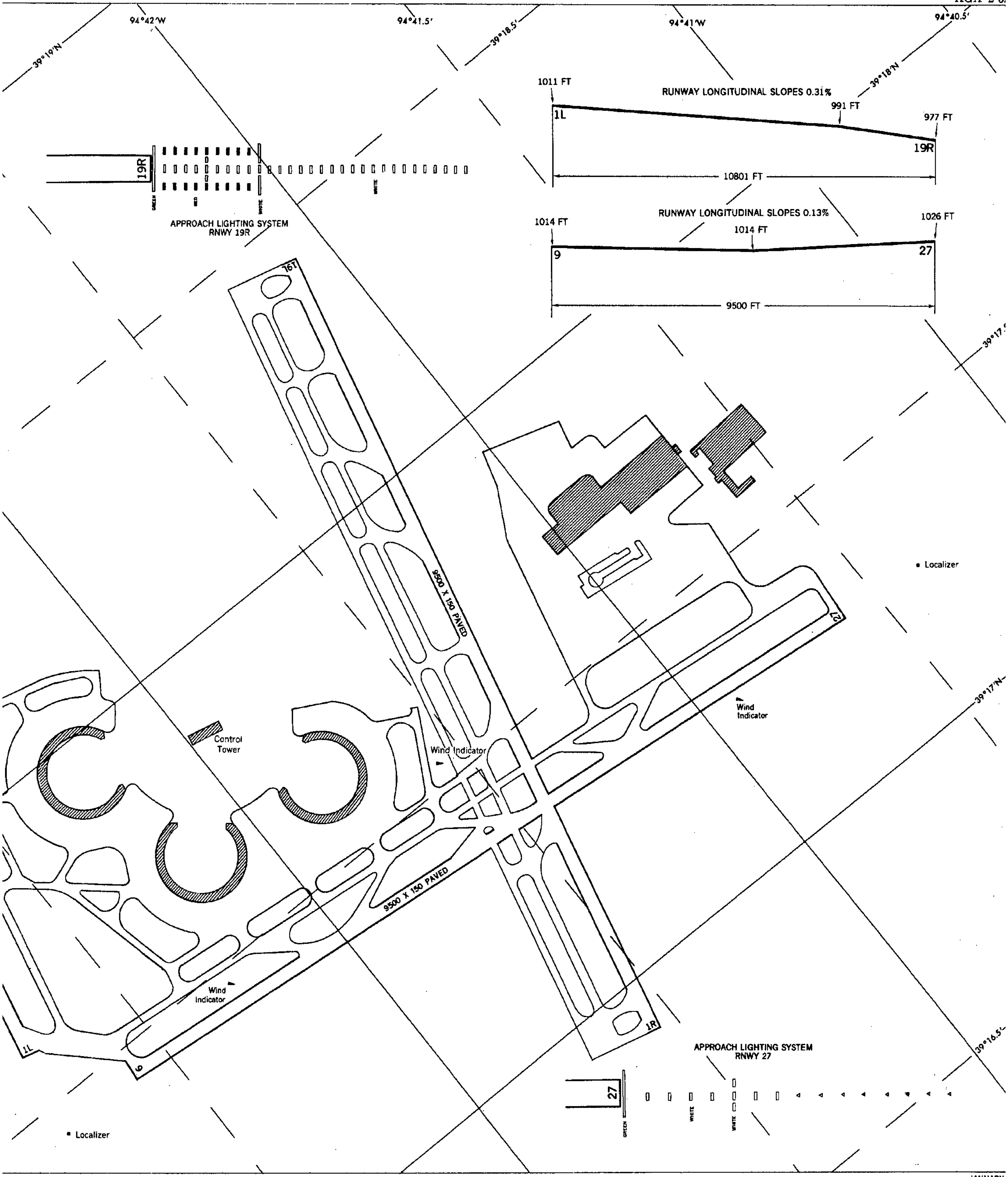
Runway Identification	01	19	09	27	01R	19L
Controlling Obstruction						
Obstn Clnc Slope	50:1	50:1	50:1	50:1	50:1	50:1
Dist from Runway End						

Obstruction Remarks: None.

41 DISABLED AIRCRAFT REMOVAL CAPABILITY:
Yes, B-707



FEDERAL AVIATION ADMINISTRATION


94°42'W
94°41.5'
94°41'W
94°40.5'
39°19'N
39°18.5'
39°18'N
39°17.5'
39°17'N
39°16.5'
1011 FT
RUNWAY LONGITUDINAL SLOPES 0.31%
991 FT
977 FT
1L
19R
10801 FT
1014 FT
RUNWAY LONGITUDINAL SLOPES 0.13%
1014 FT
1026 FT
9
27
9500 FT
19R
GREEN
RED
WHITE
WHITE
APPROACH LIGHTING SYSTEM
RNWY 19R
19L
9500 X 150 PAVED
Localizer
27
Wind Indicator
Control Tower
Wind Indicator
9500 X 150 PAVED
Wind Indicator
1L
9
1R
APPROACH LIGHTING SYSTEM
RNWY 27
27
GREEN
WHITE
WHITE
Localizer

1 CITY, STATE/AERODROME: **LOS ANGELES, CA/LOS ANGELES INTERNATIONAL**

2 REFERENCE POINT:
Lat. 33°56'33.2''N., Long. 118°24'29.1''W.

3 DISTANCE AND DIRECTION FROM CITY:
9 NM SW.

4 ELEVATION:
126 FT (38 M).

5 AERODROME REFERENCE TEMPERATURE (CENTIGRADE):
24°C. (August).

6 MAGNETIC VARIATION:
14°E.

7 TRANSITION ALTITUDE:

8 OPERATIONAL HOURS:
24 hours.

9 AERODROME OPERATOR OR ADMINISTRATIVE AUTHORITY:
City of Los Angeles

10 POSTAL ADDRESS:
Los Angeles International Airport
No. 1 World Way
Los Angeles, CA 90045

11 TELEGRAPHIC ADDRESSES:
AFTN: KLAX

12 TELEPHONE NUMBERS:
310-646-4267

13 OVERNIGHT ACCOMMODATION:
Unlimited.

14 RESTAURANT ACCOMMODATION:
Unlimited.

15 MEDICAL FACILITIES:
First-aid at airport.
Hospitals in city.

16 TRANSPORTATION AVAILABLE:
Busses, taxis, limousines, rental cars, and helicopters.

17 CARGO HANDLING FACILITIES:
Adequate for all anticipated requirements.

18 FUEL GRADES:
100, 100LL, Jet A..

19 OIL GRADES:
Piston and turbine grades available.

20 OXYGEN AND RELATED SERVICING:
High pressure oxygen.

21 REFUELING FACILITIES AND LIMITATIONS:
No.

22 HANGAR SPACE AVAILABLE FOR TRANSIENT AIRCRAFT:
No.

23 REPAIR FACILITIES AVAILABLE FOR TRANSIENT AIRCRAFT:
Major airframe and powerplant.

24 CRASH EQUIPMENT:
ARFF Index E.

25 SEASONAL AVAILABILITY:
All seasons.

26 LOCAL FLYING RESTRICTIONS AND AERODROME REMARKS:
Numerous birds on and in the VCY of the AP. RITE TFC RWYS 24R, 24L, 07L, 07R. Noise sensitive AP on westerly TKOFS, no turns BFR XNG shoreline. Over ocean APCH used 2400-0630. Practice instrument APCHS and TGL are prohibited. Overnight storage fee.

27 PRE-FLIGHT ALTIMETER CHECK POINT(S):
None.

28 METEOROLOGICAL DATA

Mean daily maximum and minimum temperatures (C°)

Temperature	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Max (A)	17	17	18	19	21	22	24	24	24	22	21	19
Min (B)	6	7	9	11	13	14	16	16	15	13	9	7

Monthly mean pressure in (MB) at approximately the time of maximum (A) and minimum (B) temperatures

(A)
(B)

Monthly mean of the relative humidity at approximately the times of maximum (A) and minimum (B) temperatures

(A)
(B)

29 SLOPE (GRADIENT): See diagram.

CONTINUED — **LOS ANGELES, CA/LOS ANGELES INTERNATIONAL**

30 PHYSICAL CHARACTERISTICS

Runway			Declared Distances				THR ELEV (ft)	Stopway (m)	Clearway (m)	PCN	Runway Surface	Stopway Surface
Designation	True BRG	Length/Width (m)	TORA (m)	TODA (m)	ASDA (m)	LDA (m)						
a	b	c	d	e	f	g	h	i	k	l	m	n
06L 24R	82°59' 262°59'	2721 x 45	2721 2721	2721 2721	2721 2721	2721 2721	112 117	- -	- -	61/R/A/W/T	CONC- Grooved	- -
06R 24L	82°59' 262°59'	3135 x 45	3135 3135	3135 3348	3135 3135	3037 3135	108 111	- -	- 213	58/R/A/W/U	CONC- Grooved	- -
07L 25R	83°00' 263°00'	3686 x 45	3686 3686	3686 3686	3686 3686	3686 3394	119 94	- -	- -	70/R/B/W/T	CONC- Grooved	- -
07R 25L	83°00' 263°00'	3382 x 60	3382 3382	3382 3382	3382 3382	3382 3382	119 94	- -	- -	51/R/A/X/U	CONC- Grooved	- -

Landing Area Remarks: RWY 25R—THR displaced 958 FT (292); RWY 06R—THR displaced 321 FT (98). High speed exits RWYS 06L, 06R, 07L, 07R, 24L, 24R, 25L, 25R. CAUTION: Turbulence may be deflected upward from the blast fence 180 FT (55) east of RWY 25R.

31 MOVEMENT AREAS

APRONS: Bitumen and CONC. TAXIWAYS: 75 FT (23) width. ASPH and CONC. HELICOPTER ALIGHTING AREA: Yes—2,700 FT (488) W of the TWR.

VISUAL GROUND AREAS

32 TAXIING GUIDANCE SYSTEM: LGTD signs at major INTS. B TWY LGTS or G CL.

33 VISUAL AIDS TO LOCATION: Rotating BCN—ALTN W and G.

34 INDICATORS AND GROUND SIGNALLING DEVICES: Wind socks—LGTD.

35 LIGHTING AIDS

APPROACH LIGHTS: RWYS 25L, 24R—ALSF2. RWYS 06L, 24L, 06R, 07L, 07R—MALSR.
VASI: RWYS 07R, 06L, 06R, 07L.
RVR: RWYS 25L, 25R, 07L, 07R, 24L, 24R, 06R, 06L.
THRESHOLD LIGHTS: All THRS—G.
RUNWAY LIGHTS: All—W high INTST. CL—RWYS 06L/24R, 07L/25R, 07R/25L, 06R/24L. TDZ—RWYS 24R, 25L, 06R.

36 EMERGENCY LIGHTING AND SECONDARY POWER SUPPLY: Yes.

37 OBSTRUCTION MARKING AND LIGHTING: R obstruction LGTS—day and NGT.

38 MARKING AIDS: RWY CL and sidestripes, numerals, THR and touchdown markings. TWY CL and TWY hold markings. RWYS 07L/25R hold lines have been relocated N on TWYS 28J, 30J, 32J, 36J, and 42J.

39 OBSTRUCTION IN APPROACH AND TAKE-OFF AREAS

Runway Identification	07R	25L	07L	25R	06R	24L	06L	24R
Controlling Obstruction	Pole	RR		RR	Pole		Pole	Sign
Obstn Clnc Slope	32:1	45:1	50:1	5:1	8:1	50:1	45:1	35:1
Dist from Runway End	2,400 (732)	1,150 (351)		325 (99)	275 (84)		3,000 (914)	1,700 (518)

Obstruction Remarks: Apch ratio to displaced thr: RWY 06R, 50:1; RWY 25R, 33:1.

41 DISABLED AIRCRAFT REMOVAL CAPABILITY: Yes, B-747

1 CITY, STATE/AERODROME: **MILWAUKEE, WI/GENERAL MITCHELL INTERNATIONAL** [ALTERNATE]

2 REFERENCE POINT:
Lat. 42°56'48.5''N, Long. 87°53'49.2''W.

3 DISTANCE AND DIRECTION FROM CITY:
5 NM S.

4 ELEVATION:
723 ft (220 M)

5 AERODROME REFERENCE TEMPERATURE (CENTIGRADE):
27°C. (July).

6 MAGNETIC VARIATION:
01°W.

7 TRANSITION ALTITUDE:

8 OPERATIONAL HOURS:
24 hours.

9 AERODROME OPERATOR OR ADMINISTRATIVE AUTHORITY:
Milwaukee County

10 POSTAL ADDRESS:
5300 S. Howell Ave.
Milwaukee, WI 53207

11 TELEGRAPHIC ADDRESSES:
AFTN: KMKE

12 TELEPHONE NUMBERS:
414-747-5300

13 OVERNIGHT ACCOMMODATION:
Unlimited.

14 RESTAURANT ACCOMMODATION:
Unlimited.

15 MEDICAL FACILITIES:
First-aid room at airport.
Ambulances and hospitals in city.

16 TRANSPORTATION AVAILABLE:
Busses, taxis, limousines and helicopter.

17 CARGO HANDLING FACILITIES:
Adequate for all anticipated requirements.

18 FUEL GRADES:
100LL, Jet A.

19 OIL GRADES:
Piston and turbine grades available.

20 OXYGEN AND RELATED SERVICING:
High pressure oxygen.

21 REFUELING FACILITIES AND LIMITATIONS:
No.

22 HANGAR SPACE AVAILABLE FOR TRANSIENT AIRCRAFT:
Yes—up to Twin Beech.

23 REPAIR FACILITIES AVAILABLE FOR TRANSIENT AIRCRAFT:
Major airframe and powerplant.

24 CRASH EQUIPMENT:
ARFF Index C.

25 SEASONAL AVAILABILITY:
All seasons.

26 LOCAL FLYING RESTRICTIONS AND AERODROME REMARKS:
Birds on and in vcy of arpt. Arpt has Noise Abatement Procedures, ctc arpt manager 414-747-5300.

27 PRE-FLIGHT ALTIMETER CHECK POINT(S):
Yes.

28 METEOROLOGICAL DATA

Mean daily maximum and minimum temperatures (C°)

Temperature	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Max (A)	-2	0	5	12	18	24	27	26	22	16	7	0
Min (B)	-10	-9	-3	2	7	13	16	16	12	6	-1	-7

Monthly mean pressure in (MB) at approximately the time of maximum (A) and minimum (B) temperatures

(A)
(B)

Monthly mean of the relative humidity at approximately the times of maximum (A) and minimum (B) temperatures

(A)
(B)

29 SLOPE (GRADIENT): See diagram.

CONTINUED — **MILWAUKEE, WI/GENERAL MITCHELL INTERNATIONAL** [ALTERNATE]

30 PHYSICAL CHARACTERISTICS

Runway			Declared Distances				THR ELEV (ft)	Stopway (m)	Clearway (m)	PCN	Runway Surface	Stopway Surface
Designation	True BRG	Length/Width (m)	TORA (m)	TODA (m)	ASDA (m)	LDA (m)						
a	b	c	d	e	f	g	h	i	k	l	m	n
01L 19R	7°10' 187°10'	2954 x 60	2954 2954	2954 2954	2954 2954	2954 2718	704 671	- -	- -	70/R/C/W/T	CONC- ASPH- Grooved	- -
01R 19L	7°10' 187°10'	1275 x 45	1275 1275	1275 1275	1275 1275	1275 1275	678 670	- -	- -	34/R/C/X/T	CONC	- -
07L 25R	58°41' 238°41'	964 x 30	964 964	964 964	964 964	964 964	672 671	- -	- -	11/F/C/X/T	ASPH	- -
07R 25L	71°39' 251°39'	2442 x 45	2442 2442	2442 2442	2442 2442	2442 2237	723 670	- -	- -	70/R/C/W/T	CONC- ASPH- Grooved	- -
13 31	132°15' 312°15'	1789 x 45	1789 1789	1789 1789	1789 1789	1566 1629	670 669	- -	- -	32/R/C/X/T	CONC	- -

Landing Area Remarks: Rwy 19R thr displaced 775 ft (236). Rwy 25L thr displaced 672 ft (205). Rwy 13 thr displaced 731 ft (223). Rwy 31 thr displaced 524 ft. (160). Rwys 13/31, 01R/19L, 07L/25R clsd exc light wt single eng acft 2200-0600 daily. Rwy 07L/25R clsd to all jet acft and acft over 12,500 lbs (5 700 KG). Rwy 01R clsd to turbojet tkof. Rwy 13/31 clsd turbojet W/O PPR 414-747-5325.

31 MOVEMENT AREAS

APRONS: Concrete.
TAXIWAYS: 75 ft (23) and 100 ft (30) widths. Concrete and asphalt.
HELICOPTER ALIGHTING AREA: None.

VISUAL GROUND AREAS

32 TAXIING GUIDANCE SYSTEM: LIGHTED SIGNS AT MAIN INTERSECTIONS. BLUE TAXIWAY LIGHTS ALL TAXIWAYS.

33 VISUAL AIDS TO LOCATION: ROTATING BEACON—ALTN W AND G.

34 INDICATORS AND GROUND SIGNALLING DEVICES: WIND INDICATOR—LIGHTED.

35 LIGHTING AIDS

APPROACH LIGHTS: Rwy 01L—ALSF1. Rwy 07R—SSALR. Rwy 19R—MALSR.
RVR: Rwys 01L, 19R, 07R.
REIL: Rwy 25L.
VASI: Rwys 07L, 25R, 25L, 13, 31, 01L, 19R, 07R.
THRESHOLD LIGHTS: All thresholds—green.
RUNWAY LIGHTS: Rwys 07R/25L, 01L/19R—white high intensity. Rwys 13/31, 07L/25R, and 01R/19L—white medium intensity. Centerline—Rwy 01L/19R. Touchdown zone—Rwy 01L.

36 EMERGENCY LIGHTING AND SECONDARY POWER SUPPLY: YES.

37 OBSTRUCTION MARKING AND LIGHTING: RED OBSTRUCTION LIGHTS—DAY AND NIGHT.

38 MARKING AIDS: RUNWAY CENTERLINE AND SIDESTRIPES, NUMERALS, THRESHOLD, AND TOUCHDOWN MARKINGS. TAXIWAY CENTERLINE AND TAXIWAY HOLD MARKINGS.

39 OBSTRUCTION IN APPROACH AND TAKE-OFF AREAS

Runway Identification	01L	19R	13	31	07R	25L	07L	25R	01R	19L
Controlling Obstruction	Tree	Pole	Pole	Pole	Tree	RR	Sign	Pole		Tree
Obstn Clnc Slope	38:1	8:1	8:1	11:1	39:1	9:1	22:1	24:1	50:1	33:1
Dist from Runway End	3,150 (960)	250 (76)	487 (148)	640 (195)	989 (301)	567 (173)	1,040 (317)	469 (143)		4,339 (1 323)

Obstruction Remarks: Ratio fm dsplcd thr Rwy 13 31:1; Rwy 19R 50:1; Rwy 31 29:1.

41 DISABLED AIRCRAFT REMOVAL CAPABILITY:
Yes, B-747

1 CITY, STATE/AERODROME: **NEW ORLEANS, LA/NEW ORLEANS INTERNATIONAL AIRPORT (MOISANT FIELD)**

2 REFERENCE POINT:
Lat. 29°59'36.1''N, Long. 90°15'28.6''W.

3 DISTANCE AND DIRECTION FROM CITY:
10 NM W.

4 ELEVATION:
6 ft (1 M)

5 AERODROME REFERENCE TEMPERATURE (CENTIGRADE):
32°C. (August).

6 MAGNETIC VARIATION:
2°E.

7 TRANSITION ALTITUDE:

8 OPERATIONAL HOURS:
24 hours.

9 AERODROME OPERATOR OR ADMINISTRATIVE AUTHORITY:
City of New Orleans

10 POSTAL ADDRESS:
New Orleans International Airport
P.O. Box 20007
New Orleans, Louisiana 70141

11 TELEGRAPHIC ADDRESSES:
AFTN: KMSY

12 TELEPHONE NUMBERS:
504-464-0831

13 OVERNIGHT ACCOMMODATION:
Unlimited.

14 RESTAURANT ACCOMMODATION:
Unlimited.

15 MEDICAL FACILITIES:
Yes.

16 TRANSPORTATION AVAILABLE:
Yes.

17 CARGO HANDLING FACILITIES:
Yes.

18 FUEL GRADES:
100LL, Jet A.

19 OIL GRADES:
Piston and turbine grades available.

20 OXYGEN AND RELATED SERVICING:
No.

21 REFUELING FACILITIES AND LIMITATIONS:
Yes. No limitations.

22 HANGAR SPACE AVAILABLE FOR TRANSIENT AIRCRAFT:
No.

23 REPAIR FACILITIES AVAILABLE FOR TRANSIENT AIRCRAFT:
None.

24 CRASH EQUIPMENT:
ARFF Index D.

25 SEASONAL AVAILABILITY:
All seasons.

26 LOCAL FLYING RESTRICTIONS AND AERODROME REMARKS:
Flocks of birds on and in vcy of ap. Locked wheel and 180° turns prohibited on asphalt sfc for aircraft 12,500 lbs (5 670) and over.

27 PRE-FLIGHT ALTIMETER CHECK POINT(S):
None.

28 METEOROLOGICAL DATA

Mean daily maximum and minimum temperatures (C°)

Temperature	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Max (A)	17	19	22	25	29	32	32	32	31	27	21	18
Min (B)	8	9	11	15	19	22	23	23	22	17	11	9

Monthly mean pressure in (MB) at approximately the time of maximum (A) and minimum (B) temperatures

(A)
(B)

Monthly mean of the relative humidity at approximately the times of maximum (A) and minimum (B) temperatures

(A)
(B)

29 SLOPE (GRADIENT): See diagram.

CONTINUED — **NEW ORLEANS, LA/NEW ORLEANS INTERNATIONAL AIRPORT (MOISANT FIELD)**

30 PHYSICAL CHARACTERISTICS

Runway			Declared Distances				THR ELEV (ft)	Stopway (m)	Clearway (m)	PCN	Runway Surface	Stopway Surface
Designation	True BRG	Length/Width (m)	TORA (m)	TODA (m)	ASDA (m)	LDA (m)						
a	b	c	d	e	f	g	h	i	k	l	m	n
01 19	15°29' 195°29'	2134 x 45	2134 2134	2134 2134	2134 2134	2134 2134	3 -1	- -	- -	94/F/D/X/U	ASPH-Grooved	- -
06 24	60°29' 240°29'	1384 x 45	1384 1384	1384 1384	1384 1384	1384 1300	2 1	- -	- -	94/F/D/X/U	ASPH	- -
10 28	105°28' 285°28'	3073 x 45	3073 3073	3073 3073	3073 3073	3073 2988	6 2	- -	- -	94/F/D/X/U	ASPH-CONC-Grooved	- -

Landing Area Remarks: Rwy 28 thr dsplcd 280 ft (85). Rwy 24 thr dsplcd 276 ft (84). Rwy 06/24 clsd to acft 25,000 lbs (11 340) and over.

31 MOVEMENT AREAS

APRONS: Concrete.
TAXIWAYS: Asphalt 75 ft (23) widths.
HELICOPTER ALIGHTING AREA: Yes.

VISUAL GROUND AREAS

32 TAXIING GUIDANCE SYSTEM:
Blue taxiway lights—taxiways 10-28 and 01-19.

33 VISUAL AIDS TO LOCATION:
Rotating beacon—alternating white and green.

34 INDICATORS AND GROUND SIGNALLING DEVICES:
Wind indicator—lighted.

35 LIGHTING AIDS

APPROACH LIGHTS: Rwy 10—ALSF1. Rwy 19—MALS. Rwy 28—MALSR.
REIL: None.
LDIN: Rwy 01.
RVR: Rwys 10, 28, 01, 19.
VASI: Rwys 19, 28, 24, 10.
THRESHOLD LIGHTS: All thresholds except Rwys 06 and 24—green.
RUNWAY LIGHTS: Rwys 01/19, 10/28, 06/24—white high intensity. Centerline—Rwys 10/28, 01/19. Touchdown zone—Rwy 10.

36 EMERGENCY LIGHTING AND SECONDARY POWER SUPPLY:
Yes.

37 OBSTRUCTION MARKING AND LIGHTING:
Red obstruction lights—day and night.

38 MARKING AIDS:
Runway centerline sidestripes, numerals, and threshold markings. Taxiway centerline and taxiway hold markings.

39 OBSTRUCTION IN APPROACH AND TAKE-OFF AREAS

Runway Identification	10	28	01	19	06	24
Controlling Obstruction		Tree	Road	Road	Pole	Road
Obstn Clnc Slope	50:1	23:1	0:1	0:1	34:1	12:1
Dist from Runway End		1,807 (551)	200 (61)	200 (62)	1,754 (535)	350 (106)

Obstruction Remarks: Apch ratio from displaced thre: Rwy 24, 50:1, Rwy 28, 33:1. 130 ft (40) mkd/lgtd crane 1,600 ft (488) SW Rwy 28 thr.

41 DISABLED AIRCRAFT REMOVAL CAPABILITY:
Yes, DC-10

1 CITY, STATE/AERODROME: **NEW YORK, NY/JOHN F. KENNEDY INTERNATIONAL**

2 REFERENCE POINT:
Lat 40°38'23.1''N, Long. 73°46'45.3''W.

3 DISTANCE AND DIRECTION FROM CITY:
13 NM SE of Manhattan.

4 ELEVATION:
13 FT (4 M).

5 AERODROME REFERENCE TEMPERATURE (CENTIGRADE):
29°C. (July).

6 MAGNETIC VARIATION:
13°W.

7 TRANSITION ALTITUDE:

8 OPERATIONAL HOURS:
24 hours.

9 AERODROME OPERATOR OR ADMINISTRATIVE AUTHORITY:
Port Authority of New York & New Jersey

10 POSTAL ADDRESS:
Dept. Marine and Aviation
New York, NY 10048

11 TELEGRAPHIC ADDRESSES:
AFTN: KJFK

12 TELEPHONE NUMBERS:
718-244-3501

13 OVERNIGHT ACCOMMODATION:
Unlimited.

14 RESTAURANT ACCOMMODATION:
Unlimited.

15 MEDICAL FACILITIES:
First-aid and ambulance at airport.
Hospitals in city.

16 TRANSPORTATION AVAILABLE:
Busses, taxis, limousines, rental cars and helicopters.

17 CARGO HANDLING FACILITIES:
Adequate for all anticipated requirements.

18 FUEL GRADES:
100LL, Jet A.

19 OIL GRADES:
Piston and turbine grades available.

20 OXYGEN AND RELATED SERVICING:
High pressure oxygen and replacement bottles.

21 REFUELING FACILITIES AND LIMITATIONS:
Prior arrangements for fuel required for non-based charter and commercial aircraft, 718-244-4411.

22 HANGAR SPACE AVAILABLE FOR TRANSIENT AIRCRAFT:
Yes.

23 REPAIR FACILITIES AVAILABLE FOR TRANSIENT AIRCRAFT:
Major airframe and powerplant.

24 CRASH EQUIPMENT:
ARFF Index E.

25 SEASONAL AVAILABILITY:
All seasons.

26 LOCAL FLYING RESTRICTIONS AND AERODROME REMARKS:
Flocks of birds on and in VCY of AP. RITE TFC RWYS 13L, 13R. LDG fee. INTL ramp ARR must obtain a gate assignment from INTL Ramp Control BFR entering ramp area. Ramp control FREQ is 130.775. High Density Traffic Airport (HDTA)—prior reservation required. Prior APV required for MILitary fighters and turboprops.

27 PRE-FLIGHT ALTIMETER CHECK POINT(S):
None.

28 METEOROLOGICAL DATA

Mean daily maximum and minimum temperatures (C°)

Temperature	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Max (A)	4	4	9	15	21	26	29	28	24	18	12	5
Min (B)	-3	-3	0	5	11	17	20	19	16	10	5	-1

Monthly mean pressure in (MB) at approximately the time of maximum (A) and minimum (B) temperatures

(A)
(B)

Monthly mean of the relative humidity at approximately the times of maximum (A) and minimum (B) temperatures

(A)
(B)

29 SLOPE (GRADIENT): See diagram.

CONTINUED — **NEW YORK, NY/JOHN F. KENNEDY INTERNATIONAL**

30 PHYSICAL CHARACTERISTICS

Runway			Declared Distances				THR ELEV (ft)	Stopway (m)	Clearway (m)	PCN	Runway Surface	Stopway Surface
Designation	True BRG	Length/Width (m)	TORA (m)	TODA (m)	ASDA (m)	LDA (m)						
a	b	c	d	e	f	g	h	i	k	l	m	n
04L 22R	30°45' 210°45'	3460 x 45	3460 3460	3460 3460	3460 3460	3460 2540	12 13	- -	- -	94/F/A/W/T	ASPH- CONC- Grooved	- -
04R 22L	30°46' 210°46'	2560 x 45	2560 2560	2560 2560	2560 2560	2560 2560	13 12	- -	- -	94/F/A/W/T	ASPH- Grooved	- -
13L 31R	120°45' 300°45'	3048 x 45	2743 3048	2743 3048	2743 3048	2746 2733	13 13	- -	- -	94/F/A/W/T	ASPH- Grooved	- -
13R 31L	120°44' 300°44'	4442 x 45	4442 4442	4442 4442	4442 4442	3648 3429	13 13	- -	- -	94/F/A/W/T	ASPH- CONC- Grooved	- -

Landing Area Remarks: RWY 13R THR displaced 2,606 FT (794). RWY 31L THR displaced 3,324 FT (1 013). RWY 22R THR displaced 3,019 FT (920). RWY 13L THR displaced 990 FT (302). RWY 31R THR displaced 1,034 FT (315). Pilots change to upper antenna for RWY 13 DEP.

31 MOVEMENT AREAS

APRONS: ASPH. TAXIWAYS: 75 FT (23) widths. ASPH. HELICOPTER ALIGHTING AREA: Yes—3,500 FT (1 067) west-north-west of TWR.

VISUAL GROUND AREAS

32 TAXIING GUIDANCE SYSTEM: LGTD SIGNS AT ALL INTS. B TWY LGTS AT RWY EXITS. G CL LGTS.

33 VISUAL AIDS TO LOCATION: ROTATING BCN—ALTN W AND G.

34 INDICATORS AND GROUND SIGNALLING DEVICES: LGTD WIND INDICATOR.

35 LIGHTING AIDS

APPROACH LIGHTS: RWY 13L—ALSF1. RWYS 31R, 22L—MALSR. RWY 04R—ALSF2.
REIL: RWYS 04L.
RVR: RWYS 31L, 31R, 04L, 04R, 22L, 22R, 13R, 13L.
VASI: RWYS 13R, 13L.
THRESHOLD LIGHTS: All THRS—G.
RUNWAY LIGHTS: RWYS 04R/22L, 04L/22R, 13L/31R, 13R/31L—W high INTST. Lead in LGTS—RWY 13L. CL LGTS—RWYS 04R/22L, 04L/22R, 13L/31R, 13R/31L. TDZ—RWYS 04R, 22L, 13L.

36 EMERGENCY LIGHTING AND SECONDARY POWER SUPPLY: YES.

37 OBSTRUCTION MARKING AND LIGHTING: R OBSTRUCTION LGTS—DAY AND NGT.

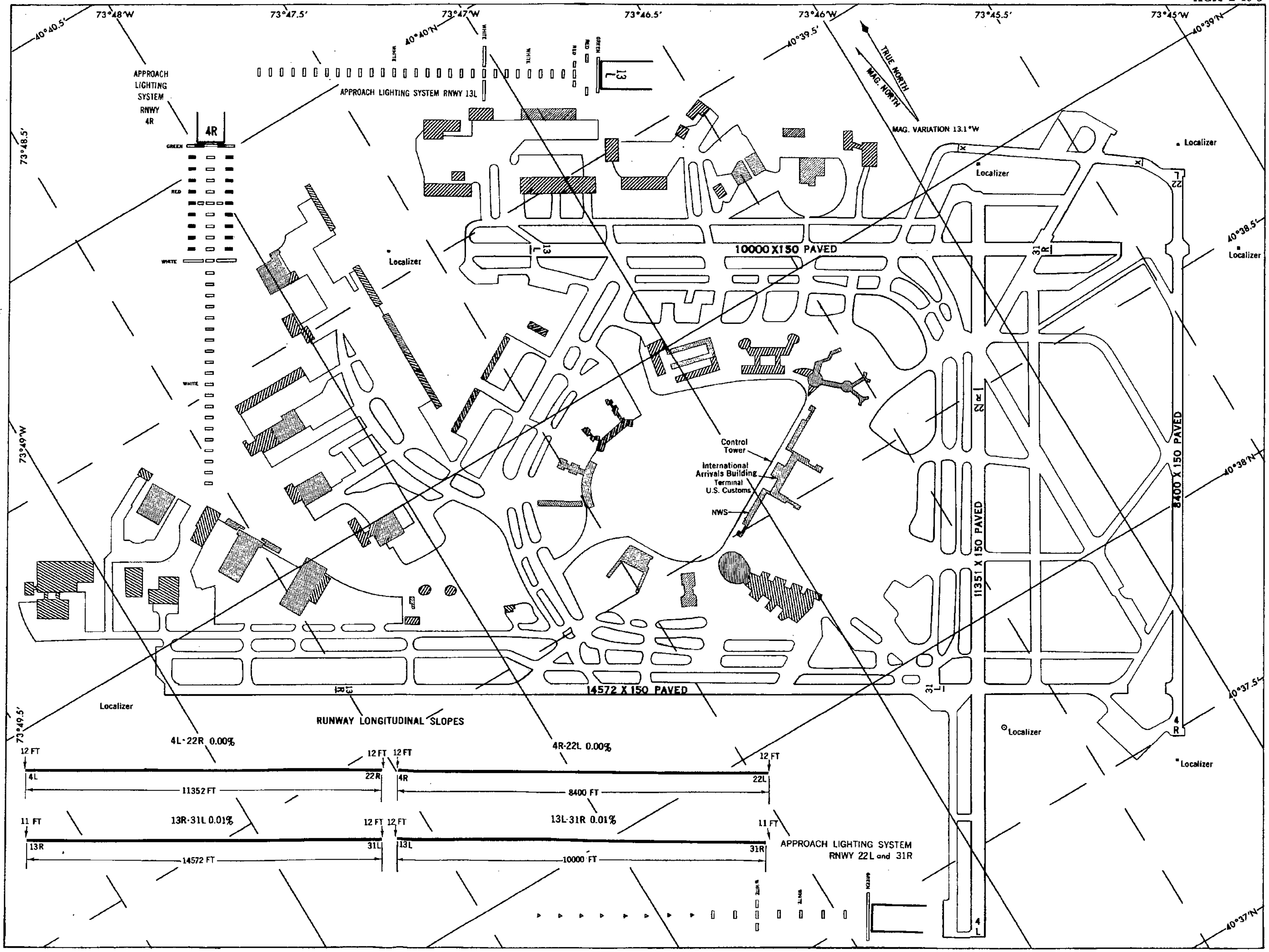
38 MARKING AIDS:
RWY CL and sidestripes, numerals, THR, and touchdown markings. TWY CL and TWY hold markings.

39 OBSTRUCTION IN APPROACH AND TAKE-OFF AREAS

Runway Identification	13R	31L	13L	31R	04R	22L	04L	22R	
Controlling Obstruction		Pole	Road	Ant	Fence			Fence	
Obstn Clnc Slope	50:1	4:1	0:1	29:1	37:1	50:1	50:1	8:1	
Dist from Runway End		350 (107)	200 (61)	1,025 (312)	500 (152)			280 (85)	1,400

Obstruction Remarks: APCH ratios to displaced THRS: RWYS 13L, 13R, 31L, 31R, and 22R, 50:1.

41 DISABLED AIRCRAFT REMOVAL CAPABILITY: YES, B-747


73°48'W
73°47.5'
73°47'W
73°46.5'
73°46'W
73°45.5'
73°45'W
73°48.5'
73°49'W
73°49.5'
40°40.5'
40°40'N
40°39.5'
40°39'N
40°38.5'
40°38'N
40°37.5'
40°37'N
APPROACH LIGHTING SYSTEM RNWY 4R
4R
GREEN
RED
WHITE
APPROACH LIGHTING SYSTEM RNWY 13L
13L
TRUE NORTH
MAG. NORTH
MAG. VARIATION 13.1°W
Localizer
10000 X 150 PAVED
11351 X 150 PAVED
8400 X 150 PAVED
14572 X 150 PAVED
13L
31R
22R
22L
13R
31L
4L
4R
Control Tower
International Arrivals Building
Terminal
U.S. Customs
NWS
RUNWAY LONGITUDINAL SLOPES
4L-22R 0.00%
4R-22L 0.00%
12 FT
11352 FT
8400 FT
13R-31L 0.01%
13L-31R 0.01%
11 FT
14572 FT
10000 FT
APPROACH LIGHTING SYSTEM RNWY 22L and 31R

1 CITY, STATE/AERODROME: **OAKLAND, CA/METROPOLITAN OAKLAND INTERNATIONAL** [ALTERNATE]

2 REFERENCE POINT:
Lat. 37°43'16.7''N, Long. 122°13'14.6''W.

3 DISTANCE AND DIRECTION FROM CITY:
4 NM S.

4 ELEVATION:
6 ft. (2 M)

5 AERODROME REFERENCE TEMPERATURE (CENTIGRADE):
22.4°C. (September)

6 MAGNETIC VARIATION:
16°48'E.

7 TRANSITION ALTITUDE:

8 OPERATIONAL HOURS:
24 hours.

9 AERODROME OPERATOR OR ADMINISTRATIVE AUTHORITY:
Port of Oakland.

10 POSTAL ADDRESS:
Metropolitan Oakland International Airport
Oakland, CA 94621

11 TELEGRAPHIC ADDRESSES:
AFTN: KOAK

12 TELEPHONE NUMBERS:
510-577-4000

13 OVERNIGHT ACCOMMODATION:
Yes.

14 RESTAURANT ACCOMMODATION:
Yes.

15 MEDICAL FACILITIES:
Yes.

16 TRANSPORTATION AVAILABLE:
Yes.

17 CARGO HANDLING FACILITIES:
Yes.

18 FUEL GRADES:
100LL, Jet A.

19 OIL GRADES:
Piston and turbine grades available.

20 OXYGEN AND RELATED SERVICING:
High and low pressure oxygen and replacement bottles.

21 REFUELING FACILITIES AND LIMITATIONS:
No.

22 HANGAR SPACE AVAILABLE FOR TRANSIENT AIRCRAFT:
No.

23 REPAIR FACILITIES AVAILABLE FOR TRANSIENT AIRCRAFT:
Major and minor airframe and powerplant.

24 CRASH EQUIPMENT:
ARFF Index D.

25 SEASONAL AVAILABILITY:
All seasons.

26 LOCAL FLYING RESTRICTIONS AND AERODROME REMARKS:
Right tfc Rwys 11, 27R, 33. Fee rwy 11/29 and tie-down. Birds in vcy. Preferential rwy use program in effect 2200-0600L; for information contact noise abatement office (510)577-4036.

27 PRE-FLIGHT ALTIMETER CHECK POINT(S):
None.

28 METEOROLOGICAL DATA

Mean daily maximum and minimum temperatures (C°)

Temperature	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Max (A)	13	15	17	19	20	22	23	22	24	22	18	14
Min (B)	5	6	7	9	11	12	13	13	13	11	7	5

Monthly mean pressure in (MB) at approximately the time of maximum (A) and minimum (B) temperatures

(A)												
(B)												

Monthly mean of the relative humidity at approximately the times of maximum (A) and minimum (B) temperatures

(A)	69	66	60	57	57	57	60	60	56	56	64	70
(B)	85	84	79	78	78	79	83	85	82	82	82	85

29 SLOPE (GRADIENT): See diagram.

CONTINUED — **OAKLAND, CA/METROPOLITAN OAKLAND INTERNATIONAL** [ALTERNATE]

30 PHYSICAL CHARACTERISTICS

Runway			Declared Distances				THR ELEV (ft)	Stopway (m)	Clearway (m)	PCN	Runway Surface	Stopway Surface
Designation	True BRG	Length/Width (m)	TORA (m)	TODA (m)	ASDA (m)	LDA (m)						
a	b	c	d	e	f	g	h	i	k	l	m	n
09L 27R	112°10' 292°10'	1662 x 45	1662 1662	1662 1662	1662 1662	1662 1662	2 3	- -	- -	34/F/C/X/T	ASPH	- -
09R 27L	112°11' 292°11'	1893 x 45	1893 1893	1893 1893	1893 1893	1893 1893	5 5	- -	- -	48/F/C/X/T	ASPH	- -
11 29	129°59' 309°59'	3048 x 45	3048 3048	3353 3353	3048 3048	3048 3048	5 5	- -	305 305	61/R/A/W/T	ASPH-Grooved	- -
15 33	164°28' 344°28'	1026 x 23	1026 1026	1026 1026	1026 1026	1026 1026	-1 1	- -	- -	25/F/C/Y/T	ASPH	- -

Landing Area Remarks: Landing Area Remarks: Rwys 09L/27R, 15/33 clsd to air carriers. High speed exits Rwys 11, 29. Turbo-jet/fan, turbo-prop acft with certified gross weight over 12,500 lbs (5 670) and 4-eng reciprocating acft prohibited fr tkof Rwys 27R, 27L or ldg Rwys 09L, 09R. Acft with experimental or limited certification having over 1,000 horsepower or 4,000 lbs (1 814) are restricted to Rwy 11/29 for all ops. Rwys 09L/27R, 09R/27L clsd to wide body acft except 09R/27L lndg avbl PPR.

31 MOVEMENT AREAS

APRONS: Asphalt.
TAXIWAYS: Asphalt.
HELICOPTER ALIGHTING AREA: Yes.

VISUAL GROUND AREAS

32 TAXIING GUIDANCE SYSTEM:
Blue taxiway lights all taxiways.

33 VISUAL AIDS TO LOCATION:
Rotating beacon—alternating white and green.

34 INDICATORS AND GROUND SIGNALLING DEVICES:
Lighted wind cone.

35 LIGHTING AIDS

APPROACH LIGHTS: Rwys 27R, 11—MALSR, Rwy 29—ALSF2.
RVR: Rwys 11, 29.
RVV: Rwys 27R, 27L.
VASI: Rwy 09R, 09L 27L.
THRESHOLD LIGHTS: All rwys, green.
RUNWAY LIGHTS: All lighted, high intensity, excpt 15/33 medium intensity. Centerline—Rwy 11/29. Touchdown zone—Rwy 29.

36 EMERGENCY LIGHTING AND SECONDARY POWER SUPPLY:
Yes.

37 OBSTRUCTION MARKING AND LIGHTING:
Red obstruction lights—day and night.

38 MARKING AIDS:
Runway centerline, touchdown zone, threshold, stripes, numerals, taxiway centerline. Rwy 27L, 29 dstc remaining signs left side.

39 OBSTRUCTION IN APPROACH AND TAKE-OFF AREAS

Runway Identification	09L	27R	09R	27L	11	29	15	33
Controlling Obstruction								
Obstn Clnc Slope	50:1	30:1	50:1	50:1	50:1	50:1	50:1	50:1
Dist from Runway End								

Obstruction Remarks: None.

41 DISABLED AIRCRAFT REMOVAL CAPABILITY:
Yes, B-707

1 CITY, STATE/AERODROME: **PHILADELPHIA, PA/PHILADELPHIA INTERNATIONAL**

2 REFERENCE POINT:
Lat. 39°52'13.3"N, Long. 75°14'42.1"W.

3 DISTANCE AND DIRECTION FROM CITY:
5 NM SW.

4 ELEVATION:
21 ft (6 M)

5 AERODROME REFERENCE TEMPERATURE (CENTIGRADE):
32°C. (July).

6 MAGNETIC VARIATION:
11°W.

7 TRANSITION ALTITUDE:

8 OPERATIONAL HOURS:
24 hours.

9 AERODROME OPERATOR OR ADMINISTRATIVE AUTHORITY:
City of Philadelphia.

10 POSTAL ADDRESS:
Division of Aviation
Philadelphia, PA 19153

11 TELEGRAPHIC ADDRESSES:
AFTN: KPHL

12 TELEPHONE NUMBERS:
215-937-6800

13 OVERNIGHT ACCOMMODATION:
Unlimited.

14 RESTAURANT ACCOMMODATION:
Unlimited.

15 MEDICAL FACILITIES:
Hospitals in adjacent area.

16 TRANSPORTATION AVAILABLE:
Busses, taxis, and limousines.

17 CARGO HANDLING FACILITIES:
Yes.

18 FUEL GRADES:
100, Jet A.

19 OIL GRADES:
Piston and turbine grades available.

20 OXYGEN AND RELATED SERVICING:
High and low pressure oxygen and replacement bottles.

21 REFUELING FACILITIES AND LIMITATIONS:
No.

22 HANGAR SPACE AVAILABLE FOR TRANSIENT AIRCRAFT:
Yes.

23 REPAIR FACILITIES AVAILABLE FOR TRANSIENT AIRCRAFT:
Major airframe and powerplant.

24 CRASH EQUIPMENT:
ARFF Index D.

25 SEASONAL AVAILABILITY:
All seasons.

26 LOCAL FLYING RESTRICTIONS AND AERODROME REMARKS:
Ldg fee. Wildlife on and in vcnty of arpt. Noise abatement procedures in effect.

27 PRE-FLIGHT ALTIMETER CHECK POINT(S):
None.

28 METEOROLOGICAL DATA

Mean daily maximum and minimum temperatures (C°)

Temperature	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Max (A)	5	5	11	17	23	28	30	29	25	20	13	7
Min (B)	-4	-4	0	5	11	16	19	18	14	8	3	-3

Monthly mean pressure in (MB) at approximately the time of maximum (A) and minimum (B) temperatures

(A)												
(B)												

Monthly mean of the relative humidity at approximately the times of maximum (A) and minimum (B) temperatures

(A)	60	56	52	49	51	52	52	55	52	53	55	58
(B)	76	75	74	73	75	76	79	82	84	83	80	77

29 SLOPE (GRADIENT): See diagram.

CONTINUED — **PHILADELPHIA, PA/PHILADELPHIA INTERNATIONAL**

30 PHYSICAL CHARACTERISTICS

Runway			Declared Distances				THR ELEV (ft)	Stopway (m)	Clearway (m)	PCN	Runway Surface	Stopway Surface
Designation	True BRG	Length/Width (m)	TORA (m)	TODA (m)	ASDA (m)	LDA (m)						
a	b	c	d	e	f	g	h	i	k	l	m	n
09L 27R	75°28' 255°28'	2896 x 45	2896 2896	2896 2896	2896 2896	2896 2896	14 11	- -	- -	-	ASPH- Grooved	- -
09R 27L	75°28' 255°28'	3200 x 60	3200 3200	3200 3200	3200 3200	3200 3200	21 10	- -	- -	-	ASPH- Grooved	- -
17 35	159°04' 339°04'	1664 x 45	1664 1664	1664 1664	1664 1664	1664 1664	9 10	- -	- -	-	ASPH- Grooved	- -

Landing Area Remarks: High speed exit Rwy 09R.

31 MOVEMENT AREAS

APRONS: Asphalt.
TAXIWAYS: Asphalt 75 ft (23) width.
HELICOPTER ALIGHTING AREA: None.

VISUAL GROUND AREAS

32 TAXIING GUIDANCE SYSTEM:
Lighted signs at major intersections. Blue taxiway lights all taxiways.

33 VISUAL AIDS TO LOCATION:
Rotating beacon—coded green emitting code letters 'PS'.

34 INDICATORS AND GROUND SIGNALLING DEVICES:
Lighted wind indicator.

35 LIGHTING AIDS

APPROACH LIGHTS: Rwy 09R—ALSF2. Rwys 27R, 27L, 17, 09L—MALSR.
RVR: Rwys 09R, 27R, 27L.
REIL: Rwys 09L, 35.
VASI: Rwys 09L, 35, 17.
THRESHOLD LIGHTS: All thresholds—green.
RUNWAY LIGHTS: Rwys 09L/27R, 09R/27L, 17/35—white high intensity. Centerline—Rwys 09L/27R, 09R/27L. Touchdown zone—Rwy 09R.

36 EMERGENCY LIGHTING AND SECONDARY POWER SUPPLY:
Yes.

37 OBSTRUCTION MARKING AND LIGHTING:

38 MARKING AIDS:
Runway centerline and sidestripes, numerals, touchdown, and threshold markings.

39 OBSTRUCTION IN APPROACH AND TAKE-OFF AREAS

Runway Identification	09L	27R	17	35	09R	27L
Controlling Obstruction	Trees	Trees	Bldg	Brush	Tree	Ship
Obstn Clnc Slope	29:1	37:1	34:1	17:1	49:1	31:1
Dist from Runway End	962 (293)	1,253 (382)	2,080 (634)	644 (196)	938 (286)	5,374 (1638)

Obstruction Remarks: None

41 DISABLED AIRCRAFT REMOVAL CAPABILITY:
Yes, B-707

1 City, State/Aerodrome: **ST. LOUIS, MO/LAMBERT-ST. LOUIS INTERNATIONAL**

2 Reference Point:
Lat. 38°44'51.7''N, Long. 90°21'35.9''W.

3 Distance and Direction from City:
10 NM NW.

4 Elevation:
605 FT (184 M).

5 Aerodrome Reference Temperature (Centigrade):
32°C. (July).

6 Magnetic Variation:
2°E.

7 Transition Altitude:

8 Operational Hours:
24 hours.

9 Aerodrome Operator or Administrative Authority:
City of St. Louis

10 Postal Address:
1320 Market Street
St. Louis, MO 63103

11 Telegraphic Addresses:
AFTN: KSTL

12 Telephone Numbers:
314-662-3201

13 Overnight Accommodation:
Unlimited.

14 Restaurant Accommodation:
Unlimited.

15 Medical Facilities:
First-aid and Paramedics at airport. Ambulances and hospitals in adjacent areas.

16 Transportation Available:
Taxis, limousines, buses, rental cars.

17 Cargo Handling Facilities:
Adequate for all anticipated requirements.

18 Fuel Grades:
100LL, A.

19 Oil Grades:
Piston and turbine grades available.

20 Oxygen and Related Servicing:
High and low pressure oxygen and replacement bottles.

21 Refueling Facilities and Limitations:
No.

22 Hangar Space Available for Transient Aircraft:
Yes—up to DC-7.

23 Repair Facilities Available for Transient Aircraft:
Major airframe and powerplant.

24 Crash Equipment:
ARFF Index D.

25 Seasonal Availability:
All seasons.

26 Local Flying Restrictions and Aerodrome Remarks:
No student solo flying. RITE TFC RWYS 30R, 12R. LDG fee for noncommercial users based on ACFT WT.

27 Pre-Flight Altimeter Check Point(s):
None.

28 Meteorological Data

Mean daily maximum and minimum temperatures (C°)

Temperature	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Max (A)	5	7	12	19	24	30	32	31	27	21	12	6
Min (B)	-5	-1	1	7	13	18	21	20	16	9	2	-3

Monthly mean pressure in (MB) at approximately the time of maximum (A) and minimum (B) temperatures

(A)												
(B)												

Monthly mean of the relative humidity at approximately the times of maximum (A) and minimum (B) temperatures

(A)	69	62	59	53	55	54	57	61	59	60	60	70
(B)	80	75	79	74	80	80	85	88	86	83	75	82

29 Slope (Gradient):See diagram.

CONTINUED — **ST. LOUIS, MO/LAMBERT-ST. LOUIS INTERNATIONAL**

30 PHYSICAL CHARACTERISTICS

Runway			Declared Distances				THR ELEV (ft)	Stopway (m)	Clearway (m)	PCN	Runway Surface	Stopway Surface
Designation	True BRG	Length/Width (m)	TORA (m)	TODA (m)	ASDA (m)	LDA (m)						
a	b	c	d	e	f	g	h	i	k	l	m	n
06 24	62°49' 242°49'	2713 x 45	2713 2713	2713 2713	2713 2713	2713 2713	551 534	- -	- -	47/R/B/W/T	CONC-Grooved	- -
12L 30R	122°11' 302°11'	2744 x 45	2744 2744	2744 2744	2744 2744	2744 2744	528 605	- -	- -	61/R/B/W/T	CONC-Grooved	- -
12R 30L	122°11' 302°11'	3359 x 60	3359 3359	3359 3359	3359 3359	3222 3301	540 583	- -	- -	61/R/B/W/T	CONC-Grooved	- -
13 31	122°12 302°12'	1916 x 23	1916 1916	1916 1916	1916 1916	1916 1356	527 556	- -	- -	27/F/B/W/T	ASPH	- -
17 35	178°59' 358°59'	917 x 23	917 917	917 917	917 917	917 877	533 542	- -	- -	19/R/B/W/T	ASPH-CONC	- -

Landing Area Remarks: RWY 12R THR displaced 448 FT (137). RWY 30L THR displaced 189 FT (58). RWY 31 THR displaced 1,838 FT (560), LDGS not authorized. RWY 35 THR displaced 130 FT (40).

31 MOVEMENT AREAS

APRONS: CONC. TAXIWAYS: 75 FT (23) width. CONC. HELICOPTER ALIGHTING AREA: None.

VISUAL GROUND AREAS

32 TAXIING GUIDANCE SYSTEM: LGTD signs at major INTS. B TWY LGTS all TWYS.

33 VISUAL AIDS TO LOCATION: Rotating BCN—ALTN W and G.

34 INDICATORS AND GROUND SIGNALLING DEVICES: Wind indicator.

35 LIGHTING AIDS

APPROACH LIGHTS: RWY 12R—SSALR. RWY 24—MALS. RWYS 30L, 12L, 06—MALSR. RWY 30R—ALSF2.
REILS: None.
RVR: RWYS 24, 12R, 30L, 30R.
VASI: RWYS 06, 12L, 30R, 30L.
THRESHOLD LIGHTS: All THRS—G.
RUNWAY LIGHTS: RWYS 12R/30L, 12L/30R, 06/24—W high INTST. RWYS 17/35, 13/31—W medium INTST. CL LGTS—RWYS 30R, 12R, 30L, 12L. TDZ—RWYS 30R, 12R, 12L, 30L.

36 EMERGENCY LIGHTING AND SECONDARY POWER SUPPLY: Yes.

37 OBSTRUCTION MARKING AND LIGHTING:

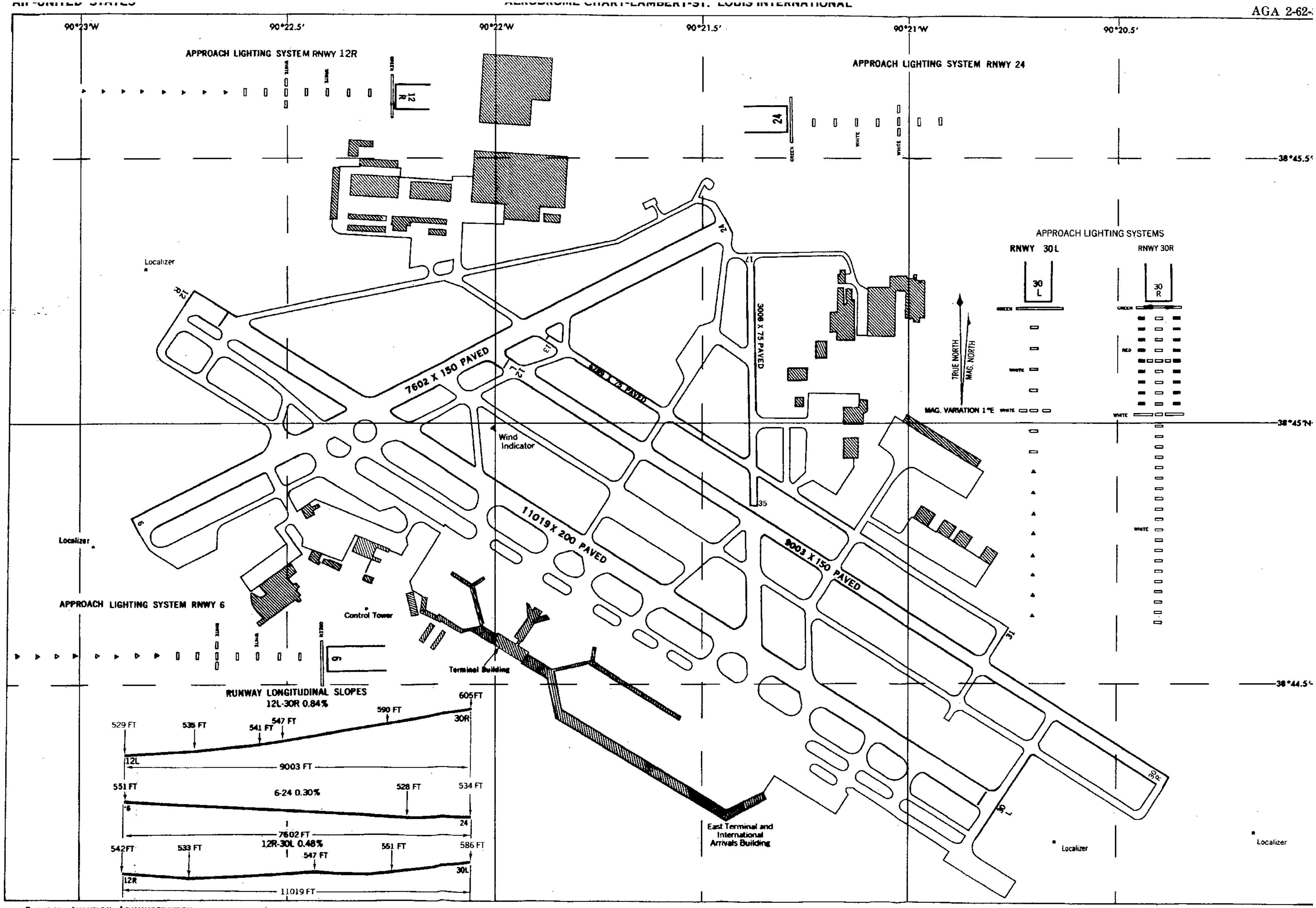
38 MARKING AIDS: RWY CL, numerals, THR, touchdown, TWY CL, and TWY hold markings.

39 OBSTRUCTION IN APPROACH AND TAKE-OFF AREAS

Runway Identification	12R	30L	12L	30R	17	35	06	24	13	31
Controlling Obstruction	Road	Sign	Bldg	Twr	RR		Tree	Sign		Road
Obstn Clnc Slope	3:1	30:1	33:1	39:1	32:1	50:1	25:1	30:1	50:1	0:1
Dist from Runway End	300 (91)	2,800 (854)	2,025 (617)	1,850 (564)	1,000 (305)		2,650 (808)	750 (229)		200 (61)

Obstruction Remarks: APCH ratio from displaced THR RWY 12R, 25:1; RWY 30L, 34:1; RWY 31, 31:1.

41 DISABLED AIRCRAFT REMOVAL CAPABILITY: Yes, B-747


90°23'W
90°22.5'
90°22'W
90°21.5'
90°21'W
90°20.5'
38°45.5'
38°45'N
38°44.5'
APPROACH LIGHTING SYSTEM RNWY 12R
APPROACH LIGHTING SYSTEM RNWY 24
APPROACH LIGHTING SYSTEMS
RNWY 30L
RNWY 30R
APPROACH LIGHTING SYSTEM RNWY 6
TRUE NORTH
MAG. NORTH
MAG. VARIATION 1°E
Localizer
7602 X 150 PAVED
3008 X 75 PAVED
11019 X 200 PAVED
9003 X 150 PAVED
Wind Indicator
Control Tower
Terminal Building
East Terminal and International Arrivals Building
RUNWAY LONGITUDINAL SLOPES
12L-30R 0.84%
529 FT
535 FT
541 FT
547 FT
590 FT
605 FT
9003 FT
6-24 0.30%
551 FT
528 FT
534 FT
7602 FT
12R-30L 0.48%
542 FT
533 FT
547 FT
551 FT
586 FT
11019 FT

1 City, State/Aerodrome: **SEATTLE, WA/SEATTLE-TACOMA INTERNATIONAL**

2 Reference Point:
Lat. 47°26'56.4''N, Long. 122°18'33.5''W.

3 Distance and Direction from City:
10 NM S.

4 Elevation:
429 ft (131 M)

5 Aerodrome Reference Temperature (Centigrade):
24°C. (July).

6 Magnetic Variation:
20°E.

7 Transition Altitude:

8 Operational Hours:
24 hours.

9 Aerodrome Operator or Administrative Authority:
Port of Seattle.

10 Postal Address:
Box 68727 Riverton Hts Br
Seattle, WA 98168

11 Telegraphic Addresses:
AFTN: KSEA

12 Telephone Numbers:
206-433-5387

13 Overnight Accommodation:
Unlimited.

14 Restaurant Accommodation:
Unlimited.

15 Medical Facilities:
First-aid room at airport.
Hospitals in city.

16 Transportation Available:
Busses, taxis, limousines and helicopter.

17 Cargo Handling Facilities:
Adequate for all anticipated requirements.

18 Fuel Grades:
100, Jet A, A1.

19 Oil Grades:
Piston and turbine grades available.

20 Oxygen and Related Servicing:
No.

21 Refueling Facilities and Limitations:
None.

22 Hangar Space Available for Transient Aircraft:
No.

23 Repair Facilities Available for Transient Aircraft:
None.

24 Crash Equipment:
ARFF Index E.

25 Seasonal Availability:
All seasons.

26 Local Flying Restrictions and Aerodrome Remarks:
Bird hazard—flocks of birds within airport vcy—check local advisories. Ldg fee.

27 Pre-Flight Altimeter Check Point(s):
None.

28 Meteorological Data

Mean daily maximum and minimum temperatures (C°)

Temperature	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Max (A)	7	10	12	16	19	22	25	24	21	16	11	9
Min (B)	1	2	3	5	8	11	12	12	10	7	4	2

Monthly mean pressure in (MB) at approximately the time of maximum (A) and minimum (B) temperatures

(A)
(B)

Monthly mean of the relative humidity at approximately the times of maximum (A) and minimum (B) temperatures

(A)
(B)

29 Slope (Gradient): See diagram.

CONTINUED — **SEATTLE, WA/SEATTLE-TACOMA INTERNATIONAL**

30 PHYSICAL CHARACTERISTICS

Runway			Declared Distances				THR ELEV (ft)	Stopway (m)	Clearway (m)	PCN	Runway Surface	Stopway Surface
Designation	True BRG	Length/Width (m)	TORA (m)	TODA (m)	ASDA (m)	LDA (m)						
a	b	c	d	e	f	g	h	i	k	l	m	n
16L 34R	180°21' 0°21'	3628 x 45	3628 3628	3628 3628	3628 3628	3479 3628	428 343	- -	- -	62/F/B/X/T	ASPH	- -
16R 34L	180°20' 0°20'	2873 x 45	2873 2873	2873 2873	2873 2873	2873 2873	426 360	- -	- -	63/R/B/X/T	CONC-Grooved	- -

Landing Area Remarks: Rwy 16L thr displaced 490 ft (149). High speed exits Rwys 16R, 34L.

31 MOVEMENT AREAS

APRONS: Concrete.
TAXIWAYS: 75 ft (23) width. Concrete.
HELICOPTER ALIGHTING AREA: Yes.

VISUAL GROUND AREAS

32 TAXIING GUIDANCE SYSTEM:
Blue taxiway lights all taxiways.

33 VISUAL AIDS TO LOCATION:
Rotating beacon—alternating white and green.

34 INDICATORS AND GROUND SIGNALLING DEVICES:
Lighted wind direction indicator atop Concourse C.

35 LIGHTING AIDS

APPROACH LIGHTS: Rwy 16R—ALSF2; Rwy 34R—ALSF1; Rwy 16L—MALSF; Rwy 34L—MALSR.
RVR: Rwys 16L, 34R, 16R, 34L.
REIL: None
VASI: Rwys 16L, 34L.
THRESHOLD LIGHTS: Rwys 16L/34R, 16R/34L—green.
RUNWAY LIGHTS: Rwys 16R/34L, 16L/34R—white high intensity. Centerline—Rwy 16R/34L, Rwy 16L/34R. Touchdown zone—Rwy 16R, Rwy 16L/34R.

36 EMERGENCY LIGHTING AND SECONDARY POWER SUPPLY:
None.

37 OBSTRUCTION MARKING AND LIGHTING:
Red obstruction lights—day and night.

38 MARKING AIDS:
Runway centerline and sidestripes, numerals, threshold, and touchdown markings. Taxiway centerline and taxiway hold markings.

39 OBSTRUCTION IN APPROACH AND TAKE-OFF AREAS

Runway Identification	16L	34R	16R	34L
Controlling Obstruction	Tree			Tree
Obstn Clnc Slope	32:1	50+:1	50:1	37:1
Dist from Runway End	2,200 (671)			5,100 (1 554)

Obstruction Remarks: Rwy 16L apch ratio 43:1 to dsplcd thr.

41 DISABLED AIRCRAFT REMOVAL CAPABILITY:
Yes, B-707

1 CITY, STATE/AERODROME: **SPOKANE, WA/SPOKANE INTERNATIONAL** [ALTERNATE]

2 REFERENCE POINT:
Lat. 47°37'11.5''N, Long. 117°32'01.9''W.

3 DISTANCE AND DIRECTION FROM CITY:
5 NM SW.

4 ELEVATION:
2,372 ft (723 M)

5 AERODROME REFERENCE TEMPERATURE (CENTIGRADE):
30°C. (July).

6 MAGNETIC VARIATION:
19°E.

7 TRANSITION ALTITUDE:

8 OPERATIONAL HOURS:
0600-2200.

9 AERODROME OPERATOR OR ADMINISTRATIVE AUTHORITY:
Spokane County-City

10 POSTAL ADDRESS:
Airport Board
Box 19186
Spokane, WA 99219

11 TELEGRAPHIC ADDRESSES:
AFTN: KGEG

12 TELEPHONE NUMBERS:
509-624-3218

13 OVERNIGHT ACCOMMODATION:
Yes.

14 RESTAURANT ACCOMMODATION:
Yes.

15 MEDICAL FACILITIES:
Yes.

16 TRANSPORTATION AVAILABLE:
Yes.

17 CARGO HANDLING FACILITIES:
Yes.

18 FUEL GRADES:
A, 100, 100LL.

19 OIL GRADES:
Piston and turbine grades avialable.

20 OXYGEN AND RELATED SERVICING:
High and low pressure oxygen and replacement bottles.

21 REFUELING FACILITIES AND LIMITATIONS:
No.

22 HANGAR SPACE AVAILABLE FOR TRANSIENT AIRCRAFT:
Limited.

23 REPAIR FACILITIES AVAILABLE FOR TRANSIENT AIRCRAFT:
Major airframe and powerplant.

24 CRASH EQUIPMENT:
ARFF Index C.

25 SEASONAL AVAILABILITY:
All seasons.

26 LOCAL FLYING RESTRICTIONS AND AERODROME REMARKS:
Bird hazards—check special notice, Class II NOTAM's. Right tfc Rwys 03 and 07. Be alert to turbulence over smoke stacks 1 MI NE arpt.

27 PRE-FLIGHT ALTIMETER CHECK POINT(S):
None.

28 METEOROLOGICAL DATA

Mean daily maximum and minimum temperatures (C°)

Temperature	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Max (A)	-1	2	8	13	19	22	28	27	22	15	5	
Min (B)	-7	5	-1	3	7	10	14	13	9	4	-1	-4

Monthly mean pressure in (MB) at approximately the time of maximum (A) and minimum (B) temperatures

(A)
(B)

Monthly mean of the relative humidity at approximately the times of maximum (A) and minimum (B) temperatures

(A)
(B)

29 SLOPE (GRADIENT): See diagram.

CONTINUED — **SPOKANE, WA/SPOKANE INTERNATIONAL** [ALTERNATE]

30 PHYSICAL CHARACTERISTICS

Runway			Declared Distances				THR ELEV (ft)	Stopway (m)	Clearway (m)	PCN	Runway Surface	Stopway Surface
Designation	True BRG	Length/Width (m)	TORA (m)	TODA (m)	ASDA (m)	LDA (m)						
a	b	c	d	e	f	g	h	i	k	l	m	n
03 21	45°30' 225°30'	2743 x 45	2743 2743	2743 2743	2743 2743	2743 2743	2368 2313	- -	- -	60/R/B/X/T	ASPH- Grooved	- -
07 25	90°30' 270°30'	2499 x 45	2499 2499	2499 2499	2499 2499	2499 2499	2372 2367	- -	- -	49/F/B/X/T	ASPH	- -

Landing Area Remarks: None.

31 MOVEMENT AREAS

APRONS: Asphalt.
TAXIWAYS: Concrete—75 ft (23) wide.
HELICOPTER ALIGHTING AREA: None.

VISUAL GROUND AREAS

32 TAXIING GUIDANCE SYSTEM:
Blue taxiway lights primary taxiways.

33 VISUAL AIDS TO LOCATION:
Rotating beacon—alternating white and green.

34 INDICATORS AND GROUND SIGNALLING DEVICES:
Wind indicator—lighted.

35 LIGHTING AIDS

APPROACH LIGHTS: Rwy 21—ALSF2. Rwy 03—MALSR.
RVR: Rwys 03, 21.
REIL: Rwys 07, 25.
VASI: Rwys 03, 07, 25.
THRESHOLD LIGHTS: Rwys 03, 21—green.
RUNWAY LIGHTS: Rwy 03/21—white high intensity. Rwy 07/25—white medium intensity. Centerline lights—Rwy 03/21. Touchdown zone—Rwy 21.

36 EMERGENCY LIGHTING AND SECONDARY POWER SUPPLY:
None.

37 OBSTRUCTION MARKING AND LIGHTING:
Red obstruction lights—day and night.

38 MARKING AIDS:
Runway centerline and numerals. Threshold, touchdown, and sidestripes Rwy 03/21. Taxiway centerlines and taxiway hold markings.

39 OBSTRUCTION IN APPROACH AND TAKE-OFF AREAS

Runway Identification	03	21	07	25
Controlling Obstruction		Terrain	Pole	Tree
Obstn Clnc Slope	50:1	13:1	36:1	25:1
Dist from Runway End		325 (99)	1,820 (555)	1,975 (602)

Obstruction Remarks: None.

41 DISABLED AIRCRAFT REMOVAL CAPABILITY:
Yes, B-747

1 CITY, STATE/AERODROME: **SYRACUSE, NY/SYRACUSE-HANCOCK INTERNATIONAL** [ALTERNATE]

2 REFERENCE POINT:
Lat. 43°06'40.2''N, Long. 76°06'22.7''W.

3 DISTANCE AND DIRECTION FROM CITY:
4NM NE.

4 ELEVATION:
421 FT (128 M).

5 AERODROME REFERENCE TEMPERATURE (CENTIGRADE):
28°C (July).

6 MAGNETIC VARIATION:
12°W.

7 TRANSITION ALTITUDE:

8 OPERATIONAL HOURS:
24 hours.

9 AERODROME OPERATOR OR ADMINISTRATIVE AUTHORITY:
City of Syracuse.

10 POSTAL ADDRESS:
City Hall
Syracuse, NY 13212

11 TELEGRAPHIC ADDRESSES:
AFTN: KSYR

12 TELEPHONE NUMBERS:
315-448-2489

13 OVERNIGHT ACCOMMODATION:
Yes.

14 RESTAURANT ACCOMMODATION:
Yes.

15 MEDICAL FACILITIES:
Yes.

16 TRANSPORTATION AVAILABLE:
Yes.

17 CARGO HANDLING FACILITIES:
Limited.

18 FUEL GRADES:
100LL, Jet A.

19 OIL GRADES:
Piston and turbine grades available.

20 OXYGEN AND RELATED SERVICING:
High and low pressure oxygen and replacement bottles.

21 REFUELING FACILITIES AND LIMITATIONS:
No.

22 HANGAR SPACE AVAILABLE FOR TRANSIENT AIRCRAFT:
Limited.

23 REPAIR FACILITIES AVAILABLE FOR TRANSIENT AIRCRAFT:
Major aircraft and engine repairs.

24 CRASH EQUIPMENT:
ARFF Index C.

25 SEASONAL AVAILABILITY:
All seasons.

26 LOCAL FLYING RESTRICTIONS AND AERODROME REMARKS:
No charter OPS THRU PAX BLDG WO prior permission. Wildlife on and in the VCY of AP. Noise abatement procedures in effect.

27 PRE-FLIGHT ALTIMETER CHECK POINT(S):
None.

28 METEOROLOGICAL DATA

Mean daily maximum and minimum temperatures (C°)

Temperature	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Max (A)	0	0	5	13	20	25	28	27	22	16	8	1
Min (B)	-9	-9	-4	3	9	14	17	16	11	6	1	-6

Monthly mean pressure in (MB) at approximately the time of maximum (A) and minimum (B) temperatures

(A)												
(B)												

Monthly mean of the relative humidity at approximately the times of maximum (A) and minimum (B) temperatures

(A)	69	69	63	55	53	53	52	54	56	56	65	70
(B)	77	78	77	74	73	75	76	81	82	82	78	77

29 SLOPE (GRADIENT): See diagram.

CONTINUED — **SYRACUSE, NY/SYRACUSE-HANCOCK INTERNATIONAL** [ALTERNATE]

30 PHYSICAL CHARACTERISTICS

Runway			Declared Distances				THR ELEV (ft)	Stopway (m)	Clearway (m)	PCN	Runway Surface	Stopway Surface
Designation	True BRG	Length/Width (m)	TORA (m)	TODA (m)	ASDA (m)	LDA (m)						
a	b	c	d	e	f	g	h	i	k	l	m	n
10 28	87°25' 267°25'	2744 x 45	2744 2744	2744 2744	2744 2744	2744 2744	419 400	- -	- -	43/F/B/X/T	ASPH- Grooved	- -
14 32	133°50' 313°50'	2286 x 45	2286 2286	2286 2286	2286 2286	2286 2286	416 402	- -	- -	43/F/B/X/T	ASPH- Grooved	- -

Landing Area Remarks: None.

31 MOVEMENT AREAS

APRONS: ASPH. TAXIWAYS: ASPH. HELICOPTER ALIGHTING AREA: No.

VISUAL GROUND AREAS

32 TAXIING GUIDANCE SYSTEM: B TWY LGTS.

33 VISUAL AIDS TO LOCATION: Rotating BCN—ALTN W and G.

34 INDICATORS AND GROUND SIGNALLING DEVICES: LGTD wind indicator, segmented circle.

35 LIGHTING AIDS

APPROACH LIGHTS: RWY 10—MALSR. RWY 14—MALS. RWY 28—ALSF2.
RVR: RWYS 10, 28.
REIL: None.
VASI: RWYS 10, 14.
THRESHOLD LIGHTS:
RUNWAY LIGHTS: RWYS 10/28 and 14/32—high INTST. CL—RWY 10/28, 14/32. TDZ—RWY 28.

36 EMERGENCY LIGHTING AND SECONDARY POWER SUPPLY: None.

37 OBSTRUCTION MARKING AND LIGHTING: R obstruction LGTS—day and NGT.

38 MARKING AIDS: RWY CL and sidestripes, numerals, THRS, touchdown, TWY CL, and taxihold marking. RWY 10/28 distance to go markers on S side of RWY; RWY 14/32, E side of RWY.

39 OBSTRUCTION IN APPROACH AND TAKE-OFF AREAS

Runway Identification	10	28	14	32
Controlling Obstruction	Trees	Trees	Trees	Tree
Obstn Clnc Slope	29:1	34:1	26:1	28:1
Dist from Runway End	1,980 (604)	1,500 (457)	1,450 (442)	2,650 (808)

Obstruction Remarks:

41 DISABLED AIRCRAFT REMOVAL CAPABILITY: Yes, B-707/C-141

1 CITY, STATE/AERODROME: **TUCSON, AZ/TUCSON INTERNATIONAL**

2 REFERENCE POINT:
Lat. 32°06'58.5"N, Long. 110°56'28.5"W.

3 DISTANCE AND DIRECTION FROM CITY:
6 NM S.

4 ELEVATION:
2,641 ft (805 M).

5 AERODROME REFERENCE TEMPERATURE (CENTIGRADE):
37°C. (July).

6 MAGNETIC VARIATION:
12°E.

7 TRANSITION ALTITUDE:

8 OPERATIONAL HOURS:
24 hours.

9 AERODROME OPERATOR OR ADMINISTRATIVE AUTHORITY:
Tucson Airport Authority

10 POSTAL ADDRESS:
Tucson International Airport
Tucson, AZ 85706

11 TELEGRAPHIC ADDRESSES:
AFTN: KTUS

12 TELEPHONE NUMBERS:
602-573-8100

13 OVERNIGHT ACCOMMODATION:
Unlimited in town.

14 RESTAURANT ACCOMMODATION:
Yes.

15 MEDICAL FACILITIES:
Yes.

16 TRANSPORTATION AVAILABLE:
Yes.

17 CARGO HANDLING FACILITIES:
Limited.

18 FUEL GRADES:
100, 100LL, Jet A.

19 OIL GRADES:
Piston and turbine grades available.

20 OXYGEN AND RELATED SERVICING:
High and low pressure oxygen and replacement bottles.

21 REFUELING FACILITIES AND LIMITATIONS:
No.

22 HANGAR SPACE AVAILABLE FOR TRANSIENT AIRCRAFT:
Limited.

23 REPAIR FACILITIES AVAILABLE FOR TRANSIENT AIRCRAFT:
Major powerplant and airframe.

24 CRASH EQUIPMENT:
ARFF Index D.

25 SEASONAL AVAILABILITY:
All seasons.

26 LOCAL FLYING RESTRICTIONS AND AERODROME REMARKS:
Right tfc Rwys 11L, 11R, 21. Tfc pattern alt for small acft 800 ft (244) AGL; for large/heavy turbojet acft, 1,400 ft (427) AGL.

27 PRE-FLIGHT ALTIMETER CHECK POINT(S):
None.

28 METEOROLOGICAL DATA

Mean daily maximum and minimum temperatures (C°)

Temperature	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Max (A)	17	19	22	27	32	37	37	35	34	28	22	18
Min (B)	3	4	7	10	14	20	23	22	20	14	7	4

Monthly mean pressure in (MB) at approximately the time of maximum (A) and minimum (B) temperatures

(A)												
(B)												

Monthly mean of the relative humidity at approximately the times of maximum (A) and minimum (B) temperatures

(A)	34	27	22	16	12	13	28	34	26	25	28	35
(B)	63	59	52	42	33	32	57	67	54	51	64	61

29 SLOPE (GRADIENT): See diagram.

CONTINUED — **TUCSON, AZ/TUCSON INTERNATIONAL**

30 PHYSICAL CHARACTERISTICS

Runway			Declared Distances				THR ELEV (ft)	Stopway (m)	Clearway (m)	PCN	Runway Surface	Stopway Surface
Designa-tion	True BRG	Length/Width (m)	TORA (m)	TODA (m)	ASDA (m)	LDA (m)						
a	b	c	d	e	f	g	h	i	k	l	m	n
03 21	45°03' 225°03'	2134 x 45	2134 2134	2134 2134	2134 2134	1878 2134	2561 2567	- -	- -	38/F/B/X/T	ASPH	- -
11L 29R	135°01' 315°01'	3351 x 45	3351 3351	3351 3351	3687 4344	3351 3351	2576 2641	336 993	- -	61/F/B/X/T	ASPH Grooved	ASPH ASPH
11R 29L	135°01' 315°01'	2778 x 23	2778 2778	2778 2778	2778 2778	2133 2778	2583 2627	- -	- -	29/F/B/X/T	ASPH	- -

Landing Area Remarks: Rwy 03 thr displaced 841 ft (256). Rwy 11R thr displaced 2,116 ft (645) and not lgtd. High speed exits Rwy 11L/29R.

31 MOVEMENT AREAS

APRONS: Bituminous and paved concrete.
TAXIWAYS: 75 ft (23) wide, bituminous and paved concrete.
HELICOPTER ALIGHTING AREA: None.

VISUAL GROUND AREAS

32 TAXIING GUIDANCE SYSTEM:
Blue taxiway lights primary taxiways.

33 VISUAL AIDS TO LOCATION:
Rotating beacon—alternating white and green.

34 INDICATORS AND GROUND SIGNALLING DEVICES:
Lighted tetrahedron.

35 LIGHTING AIDS

APPROACH LIGHTS: Rwy 11L—MALSR.
RVR: None.
REIL: Rwys 21, 29R, 29L, 11R. Rwys 11R, 29L, 29R Dalgt hrs only.
VASI: Rwys 21, 29R.
THRESHOLD LIGHTS: Rwys 03/21, 11L/29R—medium intensity.
RUNWAY LIGHTS: Rwy 11L/29R—high intensity. Rwys 03/21, 11R/29L—medium intensity.

36 EMERGENCY LIGHTING AND SECONDARY POWER SUPPLY:
No.

37 OBSTRUCTION MARKING AND LIGHTING:
Red obstruction lights—day and night.

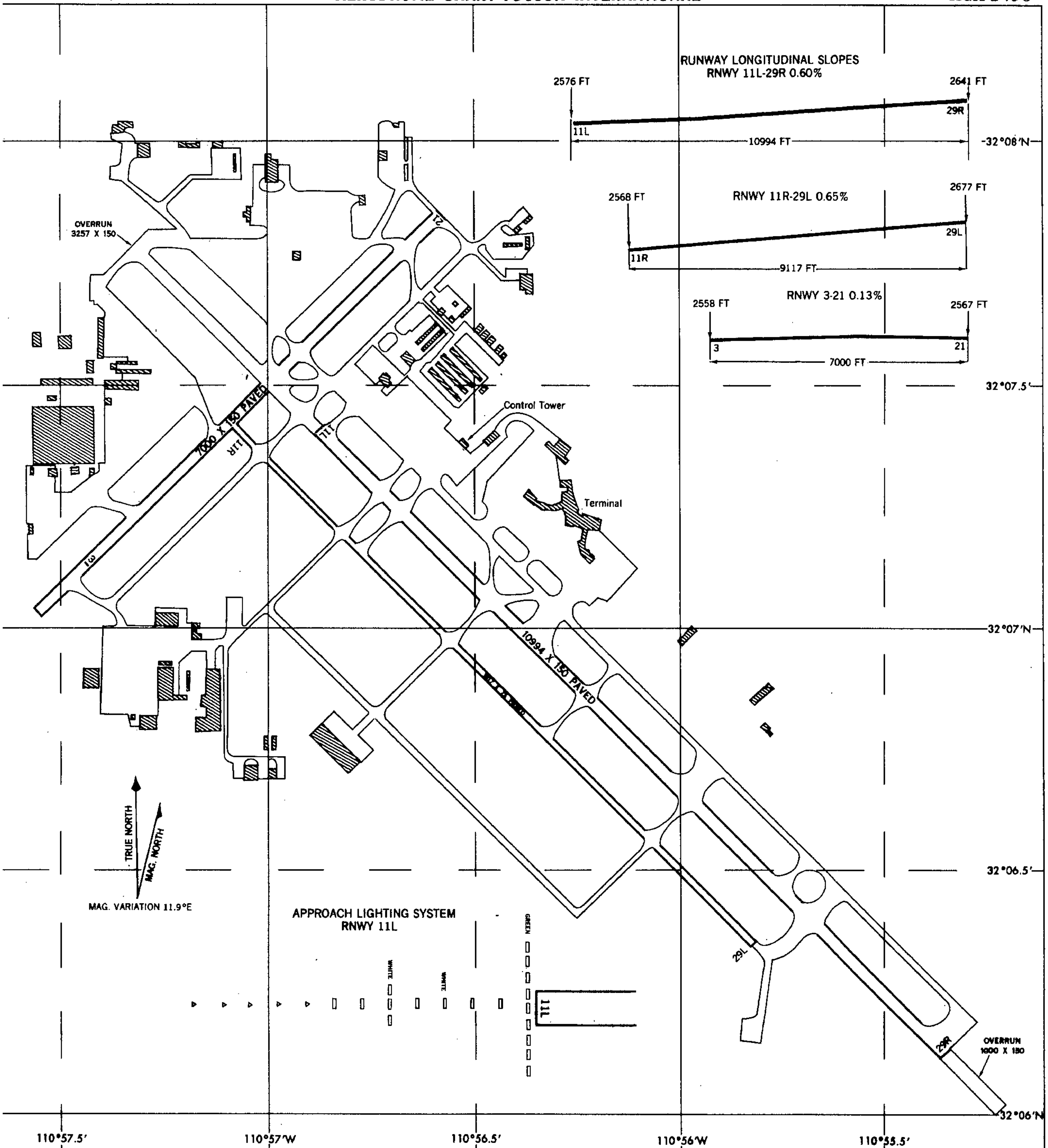
38 MARKING AIDS:
Rwys 11L/29R has distance remaining markers on NE side, Rwys 3/21 SE side only.

39 OBSTRUCTION IN APPROACH AND TAKE-OFF AREAS

Runway Identification	03	21	11L	29R	11R	29L
Controlling Obstruction	RR	Tree		Gnd		Pole
Obstn Clnc Slope	3:1	27:1	50:1	25:1	50:1	32:1
Dist from Runway End	270 (82)	1,850 (564)		400 (122)		1,400 (426)

Obstruction Remarks: Acft departing Rwy 11R attain 400 ft (122) AGL prior to starting turn. Rwy 03 apch ratio to displaced thr 50:1.

41 DISABLED AIRCRAFT REMOVAL CAPABILITY:
Yes—B-707


RUNWAY LONGITUDINAL SLOPES
RNWY 11L-29R 0.60%
2576 FT
2641 FT
11L
29R
10994 FT
RNWY 11R-29L 0.65%
2568 FT
2677 FT
11R
29L
9117 FT
RNWY 3-21 0.13%
2558 FT
2567 FT
3
21
7000 FT
OVERRUN 3257 X 150
7000 X 150 PAVED
Control Tower
Terminal
10994 X 150 PAVED
OVERRUN 1600 X 150
TRUE NORTH
MAG. NORTH
MAG. VARIATION 11.9°E
APPROACH LIGHTING SYSTEM
RNWY 11L
GREEN
WHITE
WHITE
-32°08'N
32°07.5'
-32°07'N
32°06.5'
32°06'N
110°57.5'
110°57'W
110°56.5'
110°56'W
110°55.5'

the vortex hazard may exist along the runway and in your flight path after a larger aircraft has executed a low approach, missed approach or a touch-and-go landing, particular in light quartering wind conditions. You should ensure that an interval of at least 2 minutes has elapsed before your takeoff or landing.

10.6.2.9 En route VFR (thousand-foot altitude plus 500 feet): Avoid flight below and behind a large aircraft's path. If a larger aircraft is observed above on the same track (meeting or overtaking) adjust your position laterally, preferably upwind.

10.7 Helicopters

10.7.1 In a slow hover-taxi or stationary hover near the surface, helicopter main rotor(s) generate downwash producing high velocity outwash vortices to a distance approximately three times the diameter of the rotor. When rotor downwash hits the surface, the resulting outwash vortices have behavioral characteristics similar to wing tip vortices produced by fixed wing aircraft. However, the vortex circulation is outward, upward, around, and way from the main rotor(s) in all directions. Pilots of small aircraft should avoid operating within three rotor diameters of any helicopter in a slow hover taxi or stationary hover. In forward flight, departing or landing helicopters produce a pair of strong, high-speed trailing vortices similar to wing tip vortices of larger fixed-wing aircraft. Pilots of small aircraft should use caution when operating behind or crossing behind landing and departing helicopters.

10.8 Pilot Responsibility

10.8.1 Government and industry groups are making concerted efforts to minimize or eliminate the hazards of trailing vortices. However, the flight disciplines necessary to ensure vortex avoidance during VFR operations must be exercised by the pilot. Vortex visualization and avoidance procedures should be exercised by the pilot using the same degree for concern as in collision avoidance.

10.8.2 Wake turbulence may be encountered by aircraft in flight as well as when operating on the airport movement area. (See wake turbulence definition under glossary of aeronautical terms.)

10.8.3 Pilots are reminded that in operations conducted behind all aircraft, acceptance of instructions from ATC in the following situations is an acknowledgment that the pilot will ensure safe takeoff and landing intervals and accepts the responsibility of providing his own wake turbulence separation:

10.8.3.1 Traffic information,

10.8.3.2 Instructions to follow an aircraft, and

10.8.3.3 The acceptance of a visual approach clearance.

10.8.4 For operations conducted behind heavy aircraft, ATC will specify the word "heavy" when this information is known. Pilots of heavy aircraft should always use the word "heavy" in radio communications.

10.9 Air Traffic Wake Turbulence Separations

10.9.1 Because of the possible effects of wake turbulence, controllers are required to apply no less than specified minimum separation for aircraft operating behind a heavy jet and, in certain instances, behind large nonheavy aircraft.

10.9.1.1 Separation is applied to aircraft operating directly behind a heavy jet at the same altitude or less than 1,000 feet below:

10.9.1.1.1 Heavy jet behind jet—4 miles.

10.9.1.1.2 Small/large aircraft behind heavy jet—5 miles.

10.9.1.2 Also, separation, measured at the time the preceding aircraft is over the landing threshold, is provided to small aircraft:

10.9.1.2.1 Small aircraft landing behind heavy jet—6 miles.

10.9.1.2.2 Small aircraft landing behind large aircraft—4 miles.

Note. — See Aircraft Classes in Pilot/Controller Glossary.

10.9.1.3 Additionally, appropriate time or distance intervals are provided to departing aircraft. Two minutes or the appropriate 4 or 5 mile radar separation when takeoff behind a heavy jet will be—

10.9.1.3.1 From the same threshold.

10.9.1.3.2 On a crossing runway and projected flight paths will cross.

10.9.1.3.3 From the threshold of a parallel runway when staggered ahead of that of the adjacent runway by less than 500 feet and when the runways are separated by less than 2,500 feet.

Note. — Pilots, after considering possible wake turbulence effects, may specifically request waiver of the 2-minute interval by stating, "request waiver of 2-minute interval," or a similar statement. Controllers may acknowledge this statement as pilot acceptance of responsibility for wake turbulence separation and, if traffic permits, issue takeoff clearance.

10.9.2 A 3-minute interval will be provided when a small aircraft will takeoff from an intersection on the same runway (same or opposite direction) behind a departing large aircraft, or in the opposite direction on the same runway behind a large aircraft takeoff or low/missed approach.

Note. — This 3-minute interval may be waived upon specific pilot request.

10.9.3 A 3-minute interval will be provided for all aircraft taking off when the operations are as described in (Para. 10.9.2) above, the preceding aircraft is a heavy jet, and the operations are on either the same runway or parallel runways separated by less than 2,500 feet. "Controllers may not reduce or waive this interval."

10.9.4 Pilots may request additional separation; i.e., 2 minutes instead of 4 or 5 miles for wake turbulence avoidance. This request should be made as soon as practical on ground control and at least before taxiing onto the runway.

Note. — FAR 91.3(a) states: "The pilot in command of an aircraft is directly responsible for and is the final authority as to the operation of that aircraft."

10.9.5 Controllers may anticipate separation and need not withhold a takeoff clearance for an aircraft departing behind a large/heavy aircraft if there is reasonable assurance the required separation will exist when the departing aircraft starts takeoff roll.

11. International Civil Aviation Organization (ICAO) Terminal Forecast (TAF)

11.1 Terminal forecasts for international locations and domestic military locations are available to the Flight Service Station specialist, via their weather computer. Domestic military locations are availabe to the pilot, via the Direct User Access Terminal (DUAT), but are in an international alphanumeric code. They are scheduled four times daily, for 24-hour periods, beginning at 0000Z, 0600Z, 1200Z and 1800Z.

11.2 Format. The TAF is a series of groups made up of digits and letters. An individual group is identified by its position in the sequence, by its alphanumeric coding or by a numerical indicator. Listed below are a few contractions used in the TAF. Some of the contractions are followed by time entries indicated by "tt" or "tttt" or by probability, "pp".

11.2.1 Significant weather change indicators.

GRADU tttt— A gradual change occurring during a period in excess of one-half hour. "tttt" are the beginning and ending times of the expected change to the nearest hour; i.e., "GRADU 1213" means the transition will occur between 1200Z and 1300Z.

RAPID tt— A rapid change occurring in one-half hour or less. "tt" is the time to the nearest hour of the change; i.e., "RAPID 23" means the change will occur about 2300Z.

Variability terms— indicate that short time period variations from prevailing conditions are expected with the total occurrence of these variations less than ½ of the time period during which they are called for.

TEMPO tttt— Temporary changes from prevailing conditions of less than one hour duration in each instance. There may be more than one (1) instance for a specified time period. "tttt" are the earliest and latest times during which the temporary changes are expected; i.e., "TEMPO 0107" means the temporary changes may occur between 0100Z and 0700Z.

INTER tttt— Changes from prevailing conditions are expected to occur frequently and briefly. "tttt" are the earliest and latest times the brief changes are expected; i.e., "INTER 1518" means that the brief, but frequent, changes may occur between 1500Z and 1800Z. INTER has shorter and more frequent changes than TEMPO.

11.2.2 Probability.

PROB pp— Probability of conditions occurring. "pp" is the probability in per cent; i.e., "PROB 20" means a 10 or 20% probability of the conditions occurring. "PROB 40" means a 30 to 50% inclusive probability.

11.2.3 Cloud and weather terms.

CAVOK— No clouds below 5,000 feet or below the highest minimum sector altitude whichever is greater, and no cumulonibus. Visibility 6 miles or greater. No precipitation, thunderstorms, shallow fog or low drifting snow.

WX NIL— No significant weather (no precipitation, thunderstorms or obstructions to vision).

SKC— Sky clear.

11.3 Following is a St. Louis MO forecast in TAF code.

KSTL 1212 33025/35 0800 71SN 9//05 INTER 1215 0000 75XXSN 9//000 GRADU 1516 33020 4800 38BLSN 7SC030 PROB 40 85SNSH GRADU 2122 33015 9999 WX NIL 3SC030 RAPID 00 VRB05 9999 SKC GRADU 0304 24015/25 CAVOK

11.3.1 The forecast is broken down into the elements lettered "a" to "I" to aid in the discussion. Not included in the example but explained at the end are three optional forecast groups for "m" icing, " n" turbulence and "0" temperature.

KSTL	1212	33025/35
a.	b.	c.

0800	71SN	9//005
d.	e.	f.

INTER 1215 0000 75XXSN 9//000

g.

GRADU 1516 33020 4800 38BLSN 7SC030

h.

PROB 40 85SNSH

i.

GRADU 2122 33015 9999 WX NIL 3SC030

j.

RAPID 00 VRB05 9999 SKC

k.

GRADU 0304 24015125 CAVOK

l.

a. *Station identifier.* The TAF code uses ICAO 4-letter station identifiers. In the contiguous 48 states the 3-letter identifier is prefixed with a "K"; i.e., the 3-letter identifier for Seattle is SEA while the ICAO identifier is KSEA. Elsewhere, the first two letters of the ICAO identifier tell what region the station is in. "MB" means Panama/Canal Zone (MBHO is Howard AFB); "MI" means Virgin Islands (MISX is St. Croix); "TJ" is Puerto Rico (TJSJ is San Juan); "PA" is Alaska (PACD is Cold Bay); PH" is Hawaii (PHTO is Hilo).

b. *Valid time.* Valid time of the forecast follows station identifier. "1212" means a 24-hour forecast valid from 1200Z until 1200Z the following day.

c. *Wind.* Wind is forecast usually by a 5-digit group giving degrees in 3 digits and speed in 2 digits. When wind is expected to be 100 knots or more, the group is 6-digits with speed given is 3 digits. When speed is gusty or variable, peak speed is separated from average speed with a slash. For example, in the KSTL TAF, "33025/35" means wind 330 degrees, average speed 25 knots, peak speed 35 knots. A group "160115/130" means wind 160 degrees, 115 knots, peak speed 130 knots. "00000" means calm; "VRB" followed by speed indicates direction variable; i.e., "VRBIO" means wind direction variable at 10 knots.

d. *Visibility.* Visibility is in meters. TABLE (1.) is a table for converting meters to miles and fractions. "0800" means 800 meters converted from table to ½ mile.

TABLE 1. Visibility conversion TAF code to miles

Meters	Miles	Meters	Miles	Meters	Miles
0000	0	1200	¾	3000	1 ⅞
0100	1/16	1400	⅞	3200	2
0200	⅛	1600	1	3600	2 ¼
0300	3/16	1800	1	4000	2 ½
0400	¼	2000	1 ¼	4800	3
0500	5/16	2200	1 ⅜	6000	4
0600	⅜	2400	1 ½	8000	5

RULES OF THE AIR AND AIR TRAFFIC SERVICES (RAC)

Table of Contents

AIR TRAFFIC SERVICE—INTRODUCTION

1. INTRODUCTION

1.1 Responsible Authority

1.1.1 The authority responsible for the overall administration of air traffic services provided for civil aviation in the U.S. and its territories, possessions and international airspace under its jurisdiction is the Associate Adstministrator for Air Traffic, acting under the authority of the Federal Aviation Administration.

Postal Address:
Director
Air Traffic Operations Service
Federal Aviation Administration 800 Independence Ave., SW
Washington, D.C. 20591
Telephone: 202-267-9155
Telex: 892-562
Commercial Telegraphic Address:
FAA WSH
AFTN Address:
KDCAYAYX

1.2 Area of Responsibility

1.2.1 Air traffic services as indicated in the following paragraphs are provided for the entire territory of the Conterminous U.S., Alaska, Hawaii, Puerto Rico and the U.S. Virgin Islands, and the Panama Canal Zone, as well as the International airspace in oceanic areas under the jurisdiction of the U.S. which lies within the ICAO Caribbean (CAR), North Atlantic (NAT), North American (NAM) and Pacific (PAC) regions.

1.3 Air Traffic Services

1.3.1 With the exception of terminal control services at certain civil aerodromes and military aerodromes, air traffic service in the U.S. is provided by the Air Traffic Operations Service, Federal Aviation Administration.

1.3.2 Air Traffic control is exercised within the area of responsibility of the U.S.:

(a) On all airways;

(b) In Class B, C, D and E Airspace;

(c) Within the Class A Airspace whose vertical extent is from 18,000 feet to and including FL 600 throughout most of the conterminous U.S. and, in Alaska, from 18,000 feet to and including FL 600 but not including the airspace less than 1,500 feet above the surface of the earth and the Alaskan Peninsula west of longitude 160° 00'' West (a complete description of Class A Airspace is contained in FAR Part 71).

1.3.3 Air Traffic Control and Alerting Services are provided by various ATC units and are described in RAC 3.

1.3.4 Radar service is an integral part of the ATS system. A description of Radar services and procedures is provided in RAC 1.

1.3.5 The description of airspace designated for air traffic services is found in RAC 3.

1.3.6 Procedural data and descriptions are found in RAC 4.

1.3.7 Numerous restricted and prohibited areas are established within U.S. territory. These areas, none of which interfere with normal air traffic, are given in RAC 5. Activation of areas subject to intermittent activity is notified in advance by NOTAM, giving reference to the area by its identification.

1.3.8 In general, the air traffic rules and procedures in force and the organization of the air traffic services are in conformity with ICAO Standards, Recommended Practices and Procedures. Differences between the national and international rules and procedures are given in RAC 1 and 2—the regional supplementary procedures and altimeter setting procedures being reproduced in full with an indication wherein there is a difference.

1.3.9 Coordination between the operator and air traffic services is effected in accordance with 2.11 of Annex II, and 2.1.1.4 and 2.1.2.5 of Part VIII of the PANS-RAC (DOC 4444-RAC/501).

1.3.10 Minimum Flight Altitudes on the ATS routes as listed in RAC 3 have been determined so as to ensure at least 1,000 feet vertical clearance above the highest obstacle within 4 NM on each side of centerline of the route. However, where the regular divergence (4.5 degrees) of the navigational aid signal in combination with the distance between the navigational aids could result in the aircraft being more than 4 NM on either side of the centerline, the 4 NM protection limit is increased by the extent to which the divergence is more than 4 NM from the centerline.

1.3.11 PILOT Visits to Air Traffic Facilities. Pilots are encouraged to visit air traffic facilities (Towers, Centers, and Flight Service Stations) and familiarize themselves with the ATC system. On rare occasions, facilities may not be able to approve a visit because of workload or other reasons. It is, therefore, requested that pilots contact the facility prior to the visit and advise of the number of persons in the group, the time and date of the proposed visit, and the primary interest of the group. With this information available, the facility can prepare an itinerary and have someone available to guide the group through the facility.

1.3.12 Operation Take-off and Operation Raincheck. Operation Take-off is a program that educates pilots in how best to utilize the FSS modernization efforts and services available in Automated Flight Service Stations (AFSS), as stated in FAA Order 7230.17. Operation Raincheck is a program designed to familiarize pilots with the ATC system, its functions, responsibilities and benefits.

RULES OF THE AIR AND RADAR SERVICES PROCEDURES

1. DIFFERENCES BETWEEN NATIONAL AND INTERNATIONAL RULES AND PROCEDURES

1.1 The air traffic rules and procedures applicable to air traffic in U.S. Class A, B, C, D and E airspace conform with Annexes 2 and 11 to the Convention on International Civil Aviation and to those portions, applicable to aircraft in the Procedures for Air Navigation Services — Rules of the Air and Air Traffic Services (Doc 4444 — RAC/501/10) and to the Regional Supplementary Procedures (DOC 7030) applicable to the NAM,NAT, CAR and PAC Regions, except as noted in the cases below. All differences have been registered with the International Civil Aviation Organization.

1.1.1 *Annex 3 —Rules of the Air*

See AIP section DIF.

1.1.2 *Annex 11 —Air Traffic Services*

See AIP section DIF.

1.1.3 *Procedures for Air Navigation Services — Rules of the Air (DOC 4444) and Air Traffic Services (RAC/501/10)*

See AIP section DIF.

1.1.4 *Regional Supplementary Procedures (Doc 7030)*

See AIP section DIF.

2. RADAR SERVICES AND PROCEDURES

2.1 General

2.1.1 Radar Capabilities

2.1.1.1 Radar is a method whereby radio waves are transmitted into the air and are then received when they have been reflected by an object in the path of the beam. Range is determined by measuring the time it takes (at the speed of light) for the radio wave to go out to the object and then return to the receiving antenna. The direction of a detected object from a radar site is determined by the position of the rotating antenna when the reflected portion of the radio wave is received.

2.1.1.2 More reliable maintenance and improved equipment have reduced radar system failures to a negligible factor. Most facilities actually have some components duplicated — one operating and another which immediately takes over when a malfunction occurs to the primary component.

2.1.2 Radar Limitations

It is very important for the aviation community to recognize the fact that there are limitations to radar service and that ATC controllers may not always be able to issue traffic advisories concerning aircraft which are not under ATC control and cannot be seen on radar.

2.1.2.1 The characteristics of radio waves are such that they normally travel in a continuous straight line unless they are:

(a) "Bent" by abnormal atmospheric phenomena such as temperature inversions;

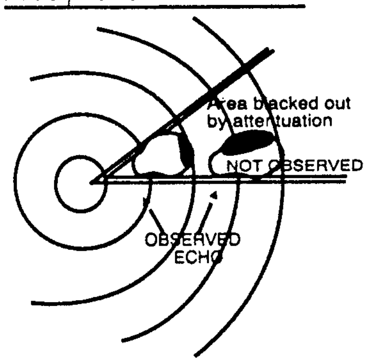
(b) Reflected or attenuated by dense objects such as heavy clouds, precipitation, ground obstacles, mountains, etc.; or

(c) Screened by high terrain features.

2.1.2.2 The bending of radar pulses, often called anomalous propagation or ducting, may cause many extraneous blips to appear on the radar operator's display if the beam has been bent toward the ground or may decrease the detection range if the wave is bent upward. It is difficult to solve the effects of anomalous propagation, but using beacon radar and electronically eliminating stationary and slow moving targets by a method called moving target indicator (MTI) usually negate the problem.

2.1.2.3 Radar energy that strikes dense objects will be reflected and displayed on the operator's scope thereby blocking out aircraft at the same range and greatly weakening or completely eliminating the display of targets at a greater range. Again, radar beacon and MTI are very effectively used to combat ground clutter and weather phenomena, and a method of circularly polarizing the radar beam will eliminate some weather returns. A negative characteristic of MTI is that an aircraft flying a speed that coincides with the canceling signal of the MTI (tangential or "blind" speed) may not be displayed to the radar controller.

Precipitation Attenuation



The nearby target absorbs and scatters so much of the out-going and returning energy that the radar does not detect the distant target.

ILLUSTRATION

2.1.2.4 Relatively low altitude aircraft will not be seen if they are screened by mountains or are below the radar beam due to earth curvature. The only solution to screening is the installation of strategically placed multiple radars which has been done in some areas.

2.1.2.5 There are several other factors which affect radar control. The amount of reflective surface of an aircraft will determine the size of the radar return. Therefore, a small light airplane or a sleek jet fighter will be more difficult to see on radar than a large commercial jet or military bomber. Here again, the use of radar beacon is invaluable if the aircraft is equipped with an airborne transponder. All ARTCC radars in the conterminous U.S. and many airport surveillance radars have the capability to interrogate Mode C and display altitude information to the controller from appropriately equipped aircraft. However, there are a number of airport surveillance radars that are still two dimensional (range and azimuth) only and altitude information must be obtained from the pilot.

2.1.2.6 At some locations within the ATC en route environment, secondary-radar-only (no primary radar) gap filler systems are used to give lower altitude radar coverage between two larger radar systems, each of which provides both primary and secondary radar coverage. In those geographical areas served by secondary-radar-only, aircraft without transponders cannot be provided with radar service. Additionally, transponder equipped aircraft cannot be provided with radar advisories concerning primary targets and weather.

2.1.2.7 The controllers' ability to advise a pilot flying on instruments or in visual conditions if his proximity to another aircraft will be limited if the unknown aircraft is not observed on radar, if no flight plan information is available, or if the volume of traffic and workload prevent his issuing traffic information. First priority is given to establishing vertical, lateral, or longitudinal separation between aircraft flying IFR under the control of ATC.

2.1.3 *Surveillance radar*

2.1.3.1 Surveillance radars are divided into two general categories: Airport Surveillance Radar (ASR) and Air Route Surveillance Radar (ARSR)

2.1.3.1.1 ASR is designed to provide relatively short range coverage in the general vicinity of an airport and to serve as an expeditious means of handling terminal area traffic through observation of precise aircraft locations on a radar scope. The ASR can also be used as an instrument approach aid.

2.1.3.1.2 ARSR is a long-range radar system designed primarily to provide a display of aircraft locations over large areas.

2.1.3.1.3 Center Radar Automated Radar Terminal Systems (ARTS) Processing (CENRAP) was developed to provide an alternative to a nonradar environment at terminal facilities should an ASR fail or malfunction. CENRAP sends aircraft radar beacon target information to the ASR terminal facility equipped with ARTS. Procedures used for the separation of aircraft may increase under certain conditions when a facility is utilizing CENRAP because radar target information updates at a slower rate than the normal ASR radar. Radar services for VFR aircraft are also limited during CENRAP operations because of the additional workload required to provide services to IFR aircraft.

2.1.3.2 Surveillance radars scan through 360° of azimuth and present target information on a radar display located in a tower or center. This information is used independently or in conjunction with other navigational aids in the control of air traffic.

2.2 Secondary Surveillance Radar

2.2.1 The AIR TRAFFIC CONTROL RADAR BEACON SYSTEM (ATCRBS), or Secondary Surveillance Radar, consists of three main components:

2.2.1.1 Interrogator. Primary radar relies on a signal being transmitted from the radar antenna site and for this signal to be reflected or "bounced back" from an object (such as an aircraft). This reflected signal is then displayed as a "target" on the controller's radar-scope. In the ATCRBS, the Interrogator, a ground based radar beacon transmitter-receiver, scans in synchronism with the primary radar and transmits discrete radio signals which repetitiously requests all transponders, on the mode being used, to reply. The replies received are then mixed with the primary returns and both are displayed on the same radar scope.

2.2.1.2 Transponder. This airborne radar beacon transmitter-receiver automatically receives the signals from the interrogator and selectively replies with a specific pulse group (code) only to those interrogations being received on the mode to which it is set. These replies are independent of, and much stronger than a primary radar return.

2.2.1.3 Radarscope. The radarscope used by the controller displays returns from both the primary radar system and the ATCRBS. These returns, called targets, are what the controller refers to in the control and separation of traffic.

2.2.2 The job of identifying and maintaining identification of primary radar targets is a long and tedious task for the controller. Some of the advantages of ATCRBS over primary radar are:

(a) Reinforcement of radar targets.

(b) Rapid target identification.

(c) Unique display of selected codes

2.2.3 A part of the ATCRBS ground equipment is the decoder. This equipment enables the controller to assign discrete transponder codes to each aircraft under his control. Normally only one code will be assigned for the entire flight. Assignments are made by the ARTCC computer on the basis of the National Beacon Code Allocation Plan. The equipment is also designed to receive Mode C altitude information from the aircraft. See Appendices one and two for an illustration of the target symbology depicted on radar scopes in the NAS Stage A (en route), the ARTS III (terminal) Systems, and other nonautomated (broadband) radar systems.

2.3 Precision Approach Radar

See AIP Section COM.

2.4 Radar Availability

2.4.1 FAA radar units operate continuously at the locations shown in the Airport/Facility Directory, and their services are available to all pilots, both civil and military. Contact the associated FAA control tower or ARTCC on any frequency guarded for initial instructions, or in an emergency, any FAA facility for information on the nearest radar service.

3. RADAR APPLICATION

3.1 Transponder Operation

3.1.1 *General*

3.1.1.1 Pilots should be aware that proper application of these procedures will provide both VFR and IFR aircraft with a high degree of safety in the environment where high-speed closure rates are possible. Transponders substantially increase the capability of radar to see an aircraft and the Mode C feature enables the controller to quickly determine where potential traffic conflicts may exist. Even VFR pilots who are not in contact with ATC will be afforded greater protection from IFR aircraft and VFR aircraft which are receiving traffic advisories. Nevertheless, pilots should never relax their visual scanning vigilance for other aircraft.

3.1.1.2 Air Traffic Control Radar Beacon System (ATC-RBS) is similar to and compatible with military coded radar beacon equipment. Civil Mode A is identical to military Mode 3.

3.1.1.3 Civil and military transponders should be adjusted to the "on" or normal operating position as late as practicable prior to takeoff and to "off" or "standby" as soon as practicable after completing landing roll, unless the change to "standby" has been accomplished previously at the request of ATC. IN ALL CASES, WHILE IN CLASS A, B, C, D AND E AIRSPACE EACH PILOT OPERATING AN AIRCRAFT EQUIPPED WITH AN OPERABLE ATC TRANSPONDER MAINTAINED IN ACCORDANCE WITH FAR 91.413 *SHALL* OPERATE THE TRANSPONDER, INCLUDING MODE C IF INSTALLED, ON THE APPROPRIATE CODE OR AS ASSIGNED BY ATC. IN CLASS G AIRSPACE, THE TRANSPONDER SHOULD BE OPERATING WHILE AIRBORNE UNLESS OTHERWISE REQUESTED BY ATC.

3.1.1.4 If a pilot on an IFR flight cancels his IFR flight plan prior to reaching his destination, he should adjust his transponder according to VFR operations.

3.1.1.5 If entering a U.S. domestic Controlled airspace from outside the U.S., the pilot should advise on first radio contact with a U.S. radar air traffic control facility that such equipment is available by adding "transponder" to the aircraft identification.

3.1.1.6 It should be noted by all users of the ATC Transponders that the coverage they can expect is limited to "line of sight." Low altitude or aircraft antenna shielding by the aircraft itself may result in reduced range. Range can be improved by climbing to a higher altitude. It may be possible to minimize antenna shielding by locating the antenna where dead spots are only noticed during abnormal flight attitudes.

3.1.2 *Transponder Code Designation*

3.1.2.1 For ATC to utilize one or a combination of the 4096 discrete codes FOUR DIGIT CODE DESIGNATION will be used, e.g., code 2100 will be expressed as TWO ONE ZERO ZERO. Due to the operational characteristics of the rapidly expanding automated air traffic control system, THE LAST TWO DIGITS OF THE SELECTED TRANSPONDER CODE SHOULD ALWAYS READ '00' UNLESS SPECIFICALLY REQUESTED BY ATC TO BE OTHERWISE.

3.1.3 *Automatic Altitude Reporting (MODE C)*

3.1.3.1 Some transponders are equipped with a Mode C automatic altitude reporting capability. This system converts aircraft altitude in 100 foot increments, to coded digital information which is transmitted together with MODE C framing pulses to the interrogating radar facility. The manner in which transponder panels are designed differs, therefore, a pilot should be thoroughly familiar with the operation of his transponder so that ATC may realize its full capabilities.

3.1.3.2 Adjust transponder to reply on the Mode A/3 code specified by ATC and, if equipped, to reply on Mode C with altitude reporting capability activated unless deactivation is directed by ATC or unless the installed aircraft equipment has not been tested and calibrated as required by FAR 91.217. If deactivation is required by ATC, run off the altitude reporting feature of your transponder. An instruction by ATC to "STOP ALTITUDE SQUAWK, ALTITUDE DIFFERS (number of feet) FEET," may be an indication that your transponder is transmitting incorrect altitude information or that you have an incorrect altimeter setting. While an incorrect altimeter setting has no effect on the Mode C altitude information transmitted by your transponder (transponders are preset at 29.92), it would cause you to fly at an actual altitude different from your assigned altitude. When a controller indicates that an altitude readout is invalid, the pilot should initiate a check to verify that the aircraft altimeter is set correctly.

3.1.3.3 Pilots of aircraft with operating Mode C altitude reporting transponders should exact altitude/flight level to the nearest hundred foot increment when establishing initial contact with an air traffic control facility. Exact altitude/flight level reports on initial contact provide air traffic control with information that is required prior to using Mode c altitude information for separation purposes. This will significantly reduce altitude verification requests.

3.1.4 *Transponder IDENT Feature*

3.1.4.1 The transponder shall be operated only as specified by ATC. Activate the "IDENT" feature only upon request of the ATC controller.

3.1.5 *Code Changes*

3.1.5.1 When making routine code changes, pilots should avoid inadvertent selection of codes 7500, 7600, or 7700 thereby causing momentary false alarms at automated ground facilities. For example when switching from code 2700 to code 7200, switch first to 2200 then 7200, NOT to 7700 and then 7200. This procedure applies to nondiscrete code 7500 and all discrete codes in the 7600 and 7700 series (i.e., 7600-7677, 7700-7777) which will trigger special indicators in automated facilities. Only nondiscrete code 7500 will be decoded as the hijack code.

3.1.5.2 Under no circumstances should a pilot of a civil aircraft operate the transponder on Code 7777. This code is reserved for military interceptor operations.

3.1.5.3 Military pilots operating VFR or IFR within restricted/warning areas should adjust their transponders to code 4000 unless another code has been assigned by ATC

3.1.6 *MODE C Transponder Requirements*

3.1.6.1 Specific details concerning requirements to carry and operate Mode C transponders, as well as exceptions and ATC authorized deviations from the requirements are found in FAR 91.215 and FAR 99.12.

3.1.6.2 In general, the FAR requires aircraft to be equipped with Mode C transponders when operating:

(a) at or above 10,000 feet MSL over the 48 contiguous states or the District of Columbia, excluding that airspace below 2,500 feet AGL;

(b) within 30 miles of a Class B airspace primary airport, below 10,000 feet MSL. Balloons, gliders, and aircraft not equipped with an engine driven electrical system are excepted from the above requirements when operating below the floor of Class A airspace and/or; outside of Class B airspace and below the ceiling of the Class B airspace (or 10,000 feet MSL, whichever is lower);

(c) within and above all Class C airspace up to 10,000 feet MSL;

(d) within 10 miles of certain designated airports from the surface to 10,000 feet MSL, excluding that airspace which is both outside Class D airspace and below 1,200 feet AGL. Balloons, gliders and aircraft not equipped with an engine driven electrical system are excepted from this requirement.

3.1.6.3 FAR 99.12 requires all aircraft flying into, within, or across the contiguous U.S. ADIZ be equipped with a Mode C or Mode S transponder. Balloons, gilders and aircraft not equipped with an engine driven electrical system are excepted from this requirement.

3.1.6.4 Pilots shall ensure that their aircraft transponder is operating on an appropriate ATC assigned VFR/IFR code and Mode C when operating in such airspace. If in doubt about the operational status of either feature of your transponder while airborne, contact the nearest ATC facility or FSS and they will advise you what facility you should contact for determining the status of your equipment.

3.1.6.5 In-flight requests for "immediate" deviation from the transponder requirements may be approved by controllers only when the flight will continue IFR or when weather conditions prevent VFR descent and continued VFR flight in airspace not affected by the FAR. All other requests for deviation should be made by contacting the nearest Flight Service or Air Traffic facility in person or by telephone. The nearest ARTCC will normally be the controlling agency and is responsible for coordinating requests involving deviations in other ARTCC areas.

3.1.7 *Transponder Operation Under Visual Flight Rules (VFR)*

3.1.7.1 Unless otherwise instructed by an Air Traffic Control Facility adjust Transponder to reply on Mode 3/A code 1200 regardless of altitude.

3.1.7.2 Adjust transponder to reply on Mode C, with altitude reporting capability activated if the aircraft is so equipped, unless deactivation is directed by ATC or unless the installed equipment has not been tested and calibrated as required by FAR 91.217. If deactivation is required and your transponder is so designed, turn off the altitude reporting switch and continue to transmit Mode C framing pulses. If this capability does not exist, turn off Mode C.

3.1.8 *Radar Beacon Phraseology*

Air Traffic controllers, both civil and military, will use the following phraseology when referring to operation of the Air Traffic Control Radar Beacon System (ATCRBS). Instructions by air traffic control refer only to Mode A/3 or Mode C operations and do not affect the operation of the transponder on other Modes.

SQUAWK (number) — Operate radar beacon transponder on designated code in Mode A/3.

IDENT — Engage the "IDENT" feature (military I/P) of the transponder.

SQUAWK (number) AND IDENT — Operate transponder on specified code in Mode A/3 and engage the "IDENT" (military I/P) feature.

SQUAWK STANDBY — Switch transponder to standby position.

SQUAWK LOW/NORMAL — Operate transponder on low or normal sensitivity as specified. Transponder is operated in "NORMAL" position unless ATC specified "LOW" ("ON" is used instead of "NORMAL" as a master control label on some types of transponders.)

SQUAWK ALTITUDE — Activate Mode C with automatic altitude reporting.

STOP ALTITUDE SQUAWK — Turn off altitude reporting switch and continue transmitting Mode C framing pulses. If your equipment does not have this capability, turn off Mode C.

STOP SQUAWK (mode in use) — Switch off specified mode. (Use for military aircraft when the controller is unaware if a military service requires the aircraft to continue operating on another Mode.

STOP SQUAWK — Switch off transponder.

SQUAWK MAYDAY — Operate transponder in the emergency position. (Mode A Code 7700 for civil transponder. Mode 3 Code 7700 and emergency feature for military transponder.)

SQUAWK VFR — Operate radar beacon transponder on code 1200 in the MODE A/3, or other appropriate VFR code.

3.1.9 *Emergency Operation*

3.1.9.1 When an emergency occurs, the pilot of an aircraft equipped with a coded radar beacon transponder, who desires to alert a ground radar facility to an emergency condition and who cannot establish communications without delay with an air traffic control facility may adjust the transponder to reply on Mode A/3, Code 7700.

3.1.9.2 Pilots should understand that they may not be within a radar coverage area and that, even if they are, certain radar facilities are not yet equipped to automatically recognize Code 7700 as an emergency signal. Therefore, they should establish radio communications with an air traffic control facility as soon as possible.

3.1.10 *Radio Failure Operation*

3.1.10.1 Should the pilot of an aircraft equipped with a coded radar beacon transponder experience a loss of two-way radio capability the pilot should:

(a) If an aircraft with a coded radar beacon transponder experiences a loss of twoway radio capability, the pilot should adjust the transponder to reply on MODE A/3, Code 7600.

(b) The pilot should understand that he may not be in an area of radar coverage.

3.1.10.2 Pilots should understand that they may not be in an area of radar coverage. Also many radar facilities are not presently equipped to automatically display code 7600 and will interrogate 7600 only when the aircraft is under direct radar control at the time of radio failure. However, replying on code 7700 first, increases the probability of early detection of a radio failure conditional

3.2 Radar Services

3.2.1 *Safety Alert*

3.2.1.1 A safety alert will be issued to pilots of aircraft being controlled by ATC if the controller is aware the aircraft is at an altitude which, in the controller's judgment, places the aircraft in unsafe proximity to terrain, obstructions or other aircraft. The provision of this service is contingent upon the capability of the controller to have an awareness of situations involving unsafe proximity to terrain, obstructions and uncontrolled aircraft. The issuance of an safety alert cannot be mandated but it can be expected on a reasonable, though intermittent basis. Once the alert is issued, it is solely the pilot's prerogative to determine what course of action, if any, he will take. This procedure is intended for use in time critical situations where aircraft safety is in question. Noncritical situations should be handled via the normal traffic alert procedures.

3.2.1.2 Terrain/obstruction Alert

3.2.1.2.1 The controller will immediately issue an alert to the pilot of an aircraft under his control when he recognizes that the aircraft is at an altitude which, in his judgment, may be in unsafe proximity to terrain/obstructions. The primary method of detecting unsafe proximity is through Mode C automatic altitude reports.

Example:

LOW ALTITUDE ALERT, CHECK YOUR ALTITUDE IMMEDIATELY, THE as appropriate, MEA/MVA/MOCA IN YOUR AREA IS (altitude) or, if past the final approach fix (non precision approach) or the outer marker or fix used in lieu of the outer marker (precision approach), THE, as appropriate, MDA/DH (if know) is (altitude).

3.2.1.2.2 Terminal ARTS IIA, III, and IIIA facilities have an automated function which, if operating, alerts the controller when a tracked Mode C equipped aircraft under his control is below or predicted to below a predetermined minimum safe altitude. This function, called Minimum Safe Altitude Warning (MSAW), is designed solely as a controller aid in detecting potentially unsafe aircraft proximity to terrain/obstructions. The ARTS IIA, III, and IIIA facility will, when MSAW is operating, provide MSAW monitoring for all aircraft with an operating Mode C altitude encoding transponder that are tracked by the system and are:

(a) Operating on a IFR flight plan, or

(b) Operating VFR and have requested MSAW monitoring.

3.2.1.2.3 Terminal AN/TPX-42A (number beacon decoder system) facilities have an automated function called Low Altitude Alert System (LAAS). Although not as sophisticated as MSAW, LAAS alerts the controller when a Mode C transponder equipped aircraft operating on a IFR flight plan is below a predetermined minimum safe altitude.

Note — Pilots operating VFR may request MSAW or LAAS monitoring if their aircraft are equipped with Mode C transponders.

EXAMPLE:

APACHE THREE THREE PAPA REQUESTS MSAW/LAAS.

3.2.1.3 Aircraft Conflict Alert

3.2.1.3.1 The controller will immediately issue an alert to the pilot of an aircraft under his control if he is aware of an aircraft that is not under his control is at an altitude which, in the controller's judgment, places both aircraft in unsafe proximity to each other. With the alert, when feasible, the controller will offer the pilot the position of the traffic if time permits and an alternate course(s) of action. Any alternate course of action the controller may recommend to the pilot will be predicated only on other traffic under his control.

Example;

AMERICAN THREE, TRAFFIC ALERT, (POSITION OF TRAFFIC, IF TIME PERMITS), ADVISE YOU TURN LEFT/RIGHT HEADING (DEGREES) AND/OR CLIMB/DESCENT TO (ALTITUDE) IMMEDIATELY.

3.2.2 *Radar Traffic Information Service (RTIS)*

A service provided by radar air traffic control facilities. Pilots receiving this service are advised of any radar target observed on the radar display which may be in such proximity to the position of their aircraft or its intended route of flight that it warrants their attention. This service is not intended to relieve the pilot of his responsibility for continual vigilance to see and avoid other aircraft.

3.2.2.1 Purpose of this Service —

3.2.2.1.1 The issuance of traffic information as observed on a radar display is based on the principle of assisting and advising a pilot that a particular radar target's position and track indicates it may intersect or pass in such proximity to his intended flight path that it warrants his attention. This is to alert the pilot to the traffic so that he can be on the lookout for it and thereby be in a better position to take appropriate action should the need arise.

3.2.2.1.2 Pilots are reminded that the surveillance radar used by ATC does not provide altitude information unless the aircraft is equipped with Mode C and the Radar Facility is capable of displaying altitude information.

3.2.2.2 Provision of the Service

3.2.2.2.1 Many factors, such as limitations of the radar, volume of traffic, controller workload and communications frequency congestion, could prevent the controller from providing this service. The controller possesses complete discretion for determining whether he is able to provide or continue to provide this service in a specific case. His reason against providing or continuing to provide the service in a particular case is not subject to question nor need it be communicated to the pilot. In other words, the provision of this service in entirely dependent up whether the controller believes he is in a position to provide it. Traffic information is routinely provided to all aircraft operating on IFR Flight Plans except when the pilot advises he does not desire the service, or the pilot is operating within Class A airspace. Traffic information may be provided to flights not operating on IFR Flight Plans when requested by pilots of such flight.

Note — Radar ATC facilities normally display and monitor both primary and secondary radar when it is available, except that secondary radar may be used as the sole display source in Class A airspace, and under some circumstances outside of Class A airspace (beyond primary coverage and in en route areas where only secondary is available). Secondary radar may also be used outside Class A airspace as the sole display source when the primary radar is temporarily unusable or out of service. Pilots in contact with the affected ATC facility are normally advised when a temporary outage occurs; i.e., "primary radar out of service; traffic advisories available on transponder aircraft only." This means simply that only the aircraft which have transponders installed and in use will be depicted on ATC radar indicators when the primary radar is temporarily out of service.

3.2.2.2.2 When receiving VFR radar advisory service, pilots should monitor the assigned frequency at all times. This is to preclude controllers' concern for radio failure of emergency assistance to aircraft under his jurisdiction. VFR radar advisory service does not include vectors away from conflicting traffic unless requested by the pilot. When advisory service is no longer desired, advise the controller before changing frequencies then change your transponder code to 1200 if applicable. THE, as appropriate, MEA/MVA/MOCA IN YOUR AREA IS (altitude) or if past the final approach fix, THE, as appropriate, MDA/DH (if known) is (altitude). Except in programs where radar service is automatically terminated, the controller will advise the aircraft when radar is terminated.

Note — Participation by VFR pilots in formal programs implemented at certain terminal locations constitutes pilot request. This also applies to participating pilots at those locations where arriving VFR flights are encouraged to make their first contact with the tower on the approach control frequency.

3.2.2.3 Issuance of Traffic Information — Traffic information will include the following concerning a target which may constitute traffic for an aircraft that is:

3.2.2.3.1 Radar identified;

(a) Azimuth from the aircraft in terms of the twelve hour clock;

(b) When rapidly maneuvering civil test or military aircraft prevent accurate issuance of traffic as in (a) above, specify the direction from an aircraft's position in terms of the eight cardinal compass points (N, NE, E, SE, S, SW, W, NW). This method shall be terminated at the pilot's request.

(c) Distance from the aircraft in nautical miles;

(d) Direction in which the target is proceeding; and

(e) Type of aircraft and altitude if known.

Example:

Traffic 10 o'clock, 3 miles, west-bound (type aircraft and altitude, if known, of the observed traffic). The altitude may be known, by means of MODE C, but not verified with the pilot for accuracy. (To be valid for separation purposes by ATC, the accuracy of MODE C readouts must be verified. This is usually accomplished upon initial entry into the radar system by a comparison of the readout to pilot stated altitude, or the field elevation in the case of continuous readout being received from an aircraft on the airport.) When necessary to issue traffic advisories containing unverified altitude information, the controller will issue the advisory in the same manner as if it were verified due to the accuracy of these readouts. The pilot may, upon receipt of traffic information, request a vector (heading) to avoid such traffic. The vector will be provided to the extent possible as determined by the controller provided the aircraft to be vectored is within the airspace under the jurisdiction of the controller

3.2.2.3.2 Not radar identified:

(a) Distance and direction with respect to a fix;

(b) Direction in which the target is proceeding; and

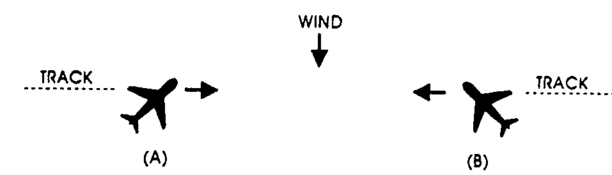
(c) Type of aircraft and altitude if known.

Example:

TRAFFIC 8 MILES SOUTH OF THE AIRPORT NORTHEASTBOUND, (TYPE AIRCRAFT AND ALTITUDE IF KNOWN).

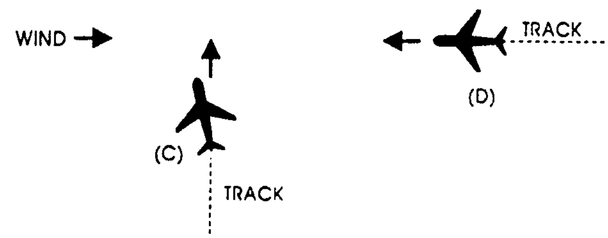
3.2.2.4 The examples depicted in the following figures point out the possible error in the position of this traffic when it is necessary for a pilot to apply drift correction to maintain this track. This error could also occur in the event a change in course is made at the time radar traffic information is issued.

3.2.2.4.1 Example 1:



In the figure, traffic information would be issued to the pilot of aircraft "A" as 12 o'clock. The actual position of the traffic as seen by the pilot of aircraft "A" would be one o'clock. Traffic information issued to aircraft "B" would also be given as 12 o'clock, but in this case, the pilot of "B" would see his traffic at 11 o'clock.

3.2.2.4.2 Example 2:



In this figure, traffic information would be issued to the pilot of aircraft "C" as two o'clock. The actual position of the traffic as seen by the pilot of aircraft "C" would be three o'clock. Traffic information issued to aircraft "D" would be at an 11 o'clock position. Since it is not necessary for the pilot of aircraft "D" to apply wind correction (crab) to make good his track, the actual position of the traffic issued would be correct. Since the radar controller can only observe aircraft track (course) on his radar display, he must issue traffic advisories accordingly, and pilots should give due consideration to this fact when looking for reported traffic.

3.2.3 *Radar Assistance to VFR Aircraft*

3.2.3.1 Radar equipped FAA Air Traffic Control facilities provide radar assistance and navigation service (vectors) to VFR aircraft provided the aircraft can communicate with the facility, are within radar coverage, and can be radar identified.

3.2.3.2 Pilots should clearly understand that authorization to proceed in accordance with such radar navigational assistance does not constitute authorization for the pilot to violate Federal Aviation Regulations. In effect, assistance provided is on the basis that navigational guidance information issued is advisory in nature and the job of flying the aircraft safely, remains with the pilot.

3.2.3.3 In many cases, the controller will be unable to determine if flight into instrument conditions will result from his instruction. To avoid possible hazards resulting from being vectored into IFR conditions, pilots should keep the controller advised of the weather conditions in which he is operating and along the course ahead.

3.2.3.4 Radar navigation assistance (vectors) may be initiated by the controller when one of the following conditions exist.

(a) The controller suggests the vector and the pilot concurs.

(b) A special program has been established and vectoring service has been advertised.

(c) In the controller's judgment the vector is necessary for air safety.

3.2.3.5 Radar navigation assistance (vectors) and other radar derived information may be provided in response to pilot requests. Many factors, such as limitations of radar, volume of traffic, communications frequency, congestion, and controller workload could prevent the controller from providing it. The controller has complete discretion for determining if he is able to provide the service in a particular case. His decision not to provide the service in a particular case is not subject to question.

3.2.4 *Terminal Radar Programs for VFR Aircraft*

3.2.4.1 Basic Radar Service

3.2.4.1.1 In addition to the use of radar for the control of IFR aircraft, all commissioned radar facilities provide the following basic radar services for VFR aircraft:

(a) Safety alerts.

(b) Traffic advisories.

(c) Limited radar vectoring (on a workload permitting basis).

(d) Sequencing at locations where procedures have been established for this purpose and/or when covered by a letter of agreement.

Note. — When the Stage services were developed, two basic radar services (traffic advisories and limited vectoring) were identified as "Stage I." This definition became unnecessary and the term "Stage I" was eliminated from use. The term "Stage II" has been eliminated in conjunction with the airspace reclassification, and sequencing services to locations with local procedures and/or letters of agreement to provide this service have been included in basic services to VFR aircraft. These basic services will still be provided by all terminal radar facilities whether they include Class B, C, D or E airspace. "Stage III" services have been replaced with "Class B" and "Terminal Radar Service Area" service where applicable.

3.2.4.1.2 Vectoring service may be provided when requested by the pilot or with pilot concurrence when suggested by ATC.

3.2.4.1.3 Pilots of arriving aircraft should contact approach control on the publicized frequency and give their position, altitude, aircraft callsign, type aircraft, radar beacon code (if transponder equipped), destination, and request traffic information.

3.2.4.1.4 Approach control will issue wind and runway, except when the pilot states "have numbers" or this information is contained in the ATIS broadcast and the pilot states that the current ATIS information has been received. Traffic information is provided on a workload permitting basis. Approach control will specify the time or place at which the pilot is to contact the tower on local control frequency for further landing information. Radar service is automatically terminated upon being advised to contact the tower.

3.2.4.1.5 Sequencing for VFR aircraft is available at certain terminal locations (see locations listed in the Airport/Facility Directory). The purpose of the service is to adjust the flow of arriving VFR and IFR aircraft into the traffic pattern in a safe and orderly manner and to provide radar traffic information to departing VFR aircraft. Pilot participation is urged but is not mandatory. Traffic information is provided on a workload permitting basis. Standard radar separation between VFR or between VFR and IFR aircraft is not provided.

3.2.4.1.6 Pilots of arriving VFR aircraft should initiate radio contact on the publicized frequency with approach control when approximately 25 miles from the airport at which sequencing services are being provided. On initial contact by VFR aircraft, approach control will assume that sequencing service is requested. After radar contact is established, the pilot may use pilot navigation to enter the traffic pattern or, depending on traffic conditions, approach control may provide the pilot with routings or vectors necessary for proper sequencing with other participating VFR and IFR traffic en route to the airport. When a flight is positioned behind a preceding aircraft and the pilot reports having that aircraft in sight, the pilot will be instructed to follow the preceding aircraft. THE ATC INSTRUCTION TO FOLLOW THE PRECEDING AIRCRAFT DOES NOT AUTHORIZE THE PILOT TO COMPLY WITH ANY ATC CLEARANCE OR INSTRUCTION ISSUED TO THE PRECEDING AIRCRAFT. If other "nonparticipating" or "local" aircraft are in the traffic pattern, the tower will issue a landing sequence. Radar service will be continued to the runway. If an arriving aircraft does not want the service, the pilot should state "NEGATIVE RADAR SERVICE" or make a similar comment, on initial contact with approach control.

3.2.4.1.7 Pilots of departing VFR aircraft are encouraged to request radar traffic information by notifying ground control on initial contact with their request and proposed direction of flight.

Example:

XRAY GROUND CONTROL, NOVEMBER ONE EIGHT SIX, CESSNA ONE SEVENTY TWO, READY TO TAXI, VFR SOUTHBOUND, HAVE INFORMATION BRAVO AND REQUEST RADAR TRAFFIC INFORMATION.

Note. — Following takeoff, the tower will advise when to contact departure control.

3.2.4.1.8 Pilots of aircraft transiting the area and in radar contact/communication with approach control will receive traffic information on a controller workload permitting basis. Pilots of such aircraft should give their position, altitude, aircraft callsign, aircraft type, radar beacon code (if transponder equipped), destination, and/or route of flight.

3.2.4.2 Terminal Radar Service Area (TRSA) Service (Radar Sequencing and Separation Service for VFR Aircraft in a TRSA).

3.2.4.2.1 This service has been implemented at certain terminal locations. The service is advertised in the Airport/Facility Directory. The purpose of this service is to provide separation between all participating VFR aircraft and all IFR aircraft operating within the airspace defined as the (TRSA). Pilot participation is urged but is not mandatory.

3.2.4.2.2 If any aircraft does not want the service, the pilot should state "NEGATIVE TRSA SERVICE" or make a similar comment, on initial contact with approach control or ground control, as appropriate.

3.2.4.2.3 TRSA's are depicted on sectional aeronautical charts and listed in the Airport/Facility Directory.

3.2.4.2.4 While operating within a TRSA, pilots are provided TRSA service and separation as prescribed in this paragraph. In the event of a radar outage, separation and sequencing of VFR aircraft will be suspended as this service is dependent on radar. The pilot will be advised that the service is not available and issued wind, runway information, and the time or place to contact the tower. Traffic information will be provided on a workload permitting basis.

3.2.4.2.5 Visual separation is used when prevailing conditions permit and it will be applied as follows:

(a) When a VFR flight is positioned behind a preceding aircraft and the pilot reports having that aircraft in sight, the pilot will be instructed by ATC to follow the preceding aircraft. THE ATC INSTRUCTION TO FOLLOW THE PRECEDING AIRCRAFT DOES NOT AUTHORIZE THE PILOT TO COMPLY WITH ANY ATC CLEARANCE OR INSTRUCTION ISSUED TO THE PRECEDING AIRCRAFT. Radar service will be continued to the runway.

(b) If other "nonparticipating" or "local" aircraft are in the traffic pattern, the tower will issue a landing sequence.

(c) Departing VFR aircraft may be asked if they can visually follow a preceding departure out of the TRSA. The pilot will be instructed to follow the other aircraft provided that the pilot can maintain visual contact with that aircraft.

3.2.4.2.6 Until visual separation is obtained, standard vertical or radar separation will be provided.

(a) 1000 feet vertical separation may be used between IFR aircraft.

(b)500 feet vertical separation may be used between VFR aircraft, or between a VFR and an IFR aircraft.

(c) Radar separation varies depending on size of aircraft and aircraft distance from the radar antenna. The minimum separation used will be 1-1/2 miles for most VFR aircraft under 12,500 pounds GWT. If being separated from larger aircraft, the minimum is increased appropriately.

3.2.4.2.7 Participating pilots operating VFR in a TRSA

(a) Must maintain an altitude when assigned by ATC unless the altitude assignment is to maintain at or below a specified altitude. ATC may assign altitudes for separation that do not conform to FAR 91.159. When the altitude assignment is no longer needed for separation or when leaving the TRSA, the instruction will be broadcast, "RESUME APPROPRIATE VFR ALTITUDES." Pilots must then return to an altitude that conforms to FAR 91.159 as soon as practicable.

(b) When not assigned an altitude, the pilot should coordinate with ATC prior to any altitude change.

3.2.4.2.8 Within the TRSA, traffic information on observed but unidentified targets will, to the extent possible, be provided all IFR and participating VFR aircraft. The pilot will be vectored to avoid the observed traffic, provided the aircraft to be vectored is within the airspace under the jurisdiction of the controller.

3.2.4.2.9 Departing aircraft should inform ATC of their intended destination and/or route of flight and proposed cruising altitude.

3.2.4.2.10 ATC will normally advise participating VFR aircraft when leaving the geographical limits of the TRSA. Radar service is not automatically terminated with this advisory unless specifically stated by the controller.

3.2.4.3 PILOT RESPONSIBILITY: THESE SERVICES ARE NOT TO BE INTERPRETED AS RELIEVING PILOTS OF THEIR RESPONSIBILITIES TO SEE AND AVOID OTHER TRAFFIC OPERATING IN BASIC VFR WEATHER CONDITIONS, TO ADJUST THEIR OPERATIONS AND FLIGHT PATH AS NECESSARY TO PRECLUDE SERIOUS WAKE ENCOUNTERS, TO MAINTAIN APPROPRIATE TERRAIN AND OBSTRUCTION CLEARANCE, OR TO REMAIN IN WEATHER CONDITIONS EQUAL TO OR BETTER THAN THE MINIMUMS REQUIRED BY FAR 91.155. WHENEVER COMPLIANCE WITH AN ASSIGNED ROUTE, HEADING AND/OR ALTITUDE IS LIKELY TO COMPROMISE PILOT RESPONSIBILITY RESPECTING TERRAIN AND OBSTRUCTION CLEARANCE, VORTEX EXPOSURE, AND WEATHER MINIMUMS, APPROACH CONTROL SHOULD BE SO ADVISED AND A REVISED CLEARANCE OR INSTRUCTION OBTAINED.

3.2.4.4 ATC services for VFR aircraft participating in terminal radar services are dependent on air traffic control radar. Services for VFR aircraft are not available during periods of a radar outage and are limited during CENRAP operations. The pilot will be advised when VFR services are limited or not available.

Note. — CLASS B and CLASS C AIRSPACE are areas of regulated airspace. The absence of ATC radar does not negate the requirement of an ATC clearance to enter CLASS B AIRSPACE or two way radio contact with ATC to enter CLASS C AIRSPACE.

3.2.4.5 Class C Service — This service provides, in addition to basic radar service, approved separation between IFR and VFR aircraft, and sequencing of VFR arrivals to the primary airport.

3.2.4.6 Class B Service — This service provides, in addition to basic radar service, approved separation of aircraft based on IFR, VFR, and/or weight, and sequencing of VFR arrivals to the primary airport(s).

3.2.5 *Tower En Route Control (TEC)*

3.2.5.1 TEC is an ATC program to provide a service to aircraft proceeding to and from metropolitan areas. It links designated approach control areas by a network of identified routes made up of the existing airway structure of the National Airspace System. The FAA has initiated an expanded TEC program to include as many facilities as possible. The program's intent is to provide an overflow resource in the low altitude system which would enhance ATC services. A few facilities have historically allow turbojets to proceed between certain city pairs, such as Milwaukee and Chicago, via tower en route and these locations may continue this service. However, the expanded TEC program will be applied, generally, for nonturbojet aircraft operating at and below 10,000 feet. The program is entirely within the approach control airspace of multiple terminal facilities. Essentially, it is for relatively short flights. Participating pilots are encouraged to use TEC for flights of 2 hours duration or less. If longer flights are planned, extensive coordination may be required with the multiple complex which could result in unanticipated delays.

3.2.5.2 Pilots requesting TEC are subject to the same delay factor at the destination airport as other aircraft in the ATC system. In addition, departure and en route delays may occur depending upon individual facility workload. When a major metropolitan airport is incurring significant delays, pilots in the TEC program may want to consider an alternative airport experiencing no delay.

3.2.5.3 There are no unique requirements upon pilots to use the TEC program. Normal flight plan filing procedures will ensure proper flight plan processing. Pilots should include the acronym "TEC" in the remarks selection of the flight plan when requesting tower en route.

3.2.5.4 All approach controls in the system may not operate up to the maximum TEC altitude of 10,000 feet. IFR flight may be planned to any satellite airport in proximity to the major primary airport via the same routing.

4. Services in Offshore Controlled Airspace.

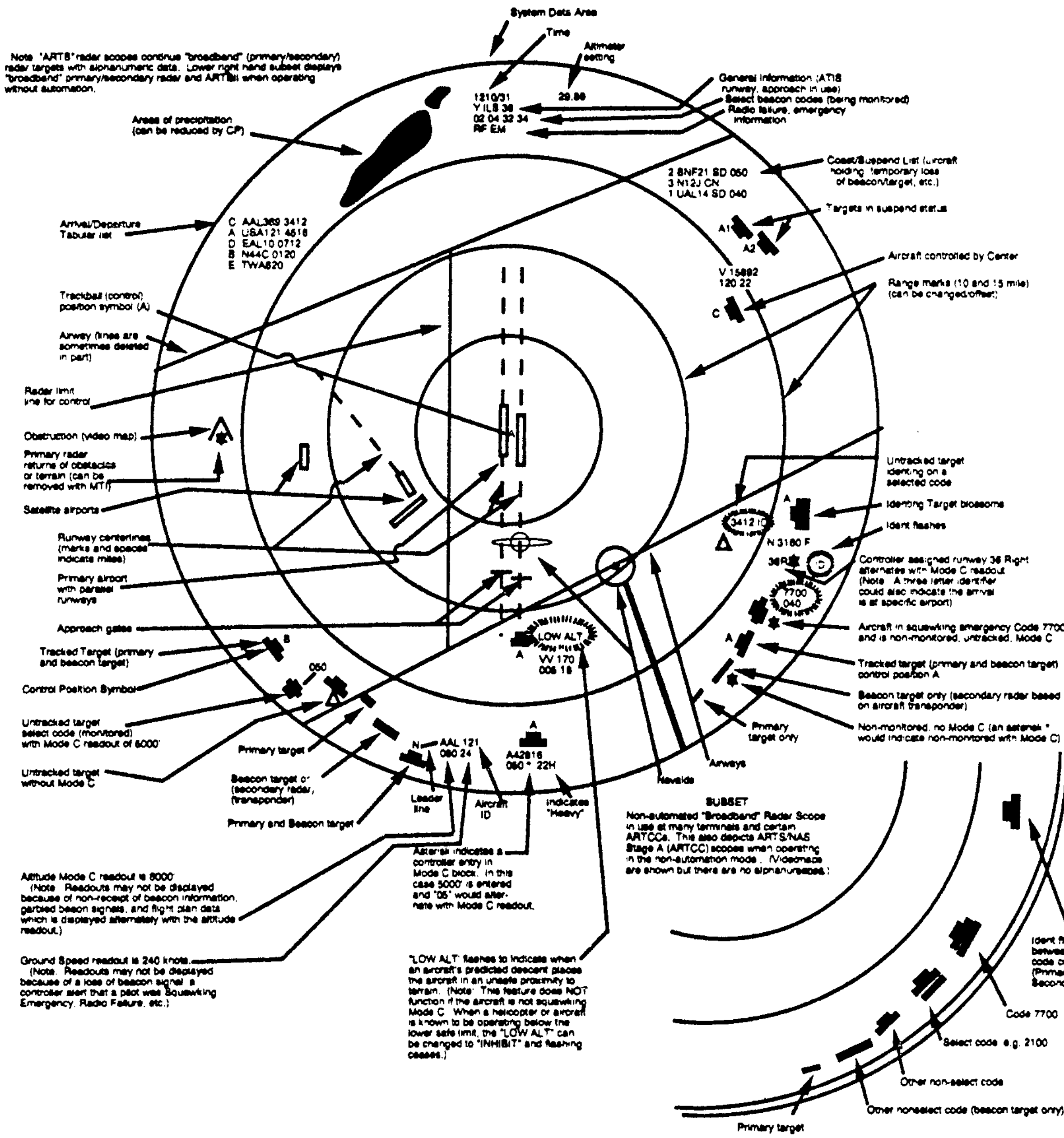
4.1 Flights which operate between the U.S. 3-mile territorial limit and the adjoining oceanic controlled airspace/flight information region (CTA/FIR) boundaries generally operate in airspace designated by federal regulation as "controlled airspace," or "offshore controlled airspace."

4.2 Within the designated areas ATC radar surveillance, ground based navigational signal coverage, and air/ground communications are capable of supporting air traffic services comparable to those provided over U.S. domestic controlled airspace.

4.3 Pilots should be aware that domestic procedures will be applied in offshore controlled airspace to both VFR and IFR aircraft using ATC services.

APPENDIX ONE

ARTS III Radar Scope with Alphanumeric Data



ARTS III Radar Scope with Alphanumeric Data Note. A number of radar terminals do not have ARTS equipment Those facilities and certain ARTCC s outside the contiguous US would have radar displays similar to the lower right hand subset ARTS facilities and NAS Stage A ARTCC's, when operating in the non-automation mode would also have similar displays and certain services based on automation may not be available

PREFLIGHT PREPARATION AND FLIGHT PLAN REQUIREMENTS

1. PREFLIGHT PREPARATION

1.1 Every pilot is urged to receive a preflight briefing and to file a flight plan. This briefing should consist of the latest or most current weather, airport, and en route NAVAID information. Briefing service may be obtained from a Flight Service Station either by telephone/interphone, by radio when airborne, or by a personal visit to the station. In the contiguous 48 States, pilots with a current FAA medical certificate may access toll-free the Direct User Access Terminal System (DUATS) through a personal computer. DUATS will provide alpha-numeric preflight weather data and allow pilots to file domestic VFR and IFR flight plans. (For a list of DUATS vendors, see MET 5.5, FAA WEATHER SERVICES.)

Note—Pilots filing flight plans via "fast file" who desire to have their briefing recorded, should include a statement at the end of the recording as to the source of their weather briefing.

1.2 The information required by the FAA to process flight plans is contained on FAA Form 7233-1, Flight Plan. (See RAC-3 FLIGHT PLAN REQUIREMENTS.) The forms are available at all flight service stations. Additional copies will be provided on request.

1.3 Consult an FSS or Weather Service Office (WSO) for preflight weather briefing. Supplemental Weather Service Locations (SWSLs) do not provide weather briefings.

1.4 FSS's are required to advise of pertinent NOTAM's if a **standard** briefing is requested, but if they are overlooked, don't hesitate to remind the specialist that you have not received NOTAM information. Additionally, NOTAM's which are known in sufficient time for publication and are of 7 days duration or longer are normally incorporated into the Notices to Airmen publication and carried there until cancellation time. FDC NOTAM's, which apply to instrument flight procedures, are also included in Notices to Airmen publication up to and including the number indicated in the FDC NOTAM legend. These NOTAM's are not provided during a briefing unless specifically requested by the pilot since the FSS specialist has no way of knowing whether the pilot has already checked Notices to Airmen publication prior to calling. Remember to ask for NOTAM's contained in the Notices to Airmen publication; they are not normally furnished during your briefing.

1.5 Pilots are urged to use only the latest issue of aeronautical charts in planning and conducting flight operations. Aeronautical charts are revised and reissued on a periodic basis to ensure that depicted data are current and reliable. In the conterminous United States, sectional charts are updated each 6 months, IFR en route charts each 56 days, and amendments to civil IFR approach charts are accomplished on a 56-day cycle with a change notice volume issued on the 28-day mid-cycle. Charts that have been superseded by those of a more recent date may contain obsolete or incomplete flight information.

1.6 When requesting a preflight briefing, identify yourself as a pilot and provide the following:

a. Type of flight planned; e.g., VFR or IFR.

b. Aircraft number or pilot's name.

c. Aircraft type.

d. Departure Airport.

e. Route of flight.

f. Destination.

g. Flight altitude (s).

h. ETD and ETE.

1.7 Prior to conducting a briefing, briefers are required to havethe background information listed above so that they may tailor the briefing to the needs of the proposed flight. The objective is to communicate a "picture" of meteorological and aeronautical information necessary for the conduct of a safe and efficient flight. Briefers use all available weather and aeronautical information to summarize data applicable to the proposed flight. They do not read weather reports and forecasts verbatim unless specifically requested by the pilot. Refer to MET-0 para 5.3.3 for those items of a weather briefing that should be expected or requested.

1.8 The Federal Aviation Administration (FAA) by Federal Aviation Regulation, Part 93, Subpart K, has designated High Density Traffic Airports (HDTA) and has prescribed air traffic rules and requirements for operating aircraft (excluding helicopter operations) to and from these airports (see details in Airport/Facility Directory, Special Notices Section).

1.9 In addition to the filing of a flight plan, if the flightwill traverse or land in one or more foreign countries, it is particularly important that pilots leave a complete itinerary with someone directly concerned, keep that person advised of the flights progress and inform him that, if serious doubt arises as the the safety of the flight, he should first contact the FSS.

1.10 Pilots operating aircraft underthe provisions of an FAR Part 135, ATCO, certificate and not having an FAA assigned 3-letter designator, are urged to prefix the normal aircraft registration (N) number with the letter "T" on flight plan filing.

Example: TN 1234B.

1.11 Follow IFR Procedure Event When Operating VFR

1.11.1 To maintain IFR proficiency, pilots are urged to practice IFR procedures whenever possible, even when operating VFR. Some suggested practices include:

a. Obtain a complete preflight and weather briefing. Check the NOTAM's.

b. File a flight plan. This is an excellent low cost insurance policy. The cost is the time it takes to fill it out. The insurance includes the knowledge that someone will be looking for you if your become overdue at your destination.

c. Use current charts.

d. Use the navigation aids. Practice maintaining a good course—keep the needle centered.

e. Maintain a constant altitude appropriate for direction of flight.

f. Estimate en route position times.

g. Make accurate and frequent position reports to the FSS's along your route of flight.

1.11.2 Simulated IFR flight is recommended (under the hood); however, pilots are cautioned to review and adhere to the requirements specified in FAR 91.109 before and during such flight.

1.11.3 VFR At Night

When flying VFR at night, in addition to the altitude appropriate for the direction of flight, pilots should maintain an altitude which is at or above the minimum en route altitude as shown on charts. This is especially true in mountainous terrain, where there is usually very little ground reference. Do not depend on your eyes alone to avoid rising unlighted terrain, or even lighted obstructions such as TV towers.

2. DOMESTIC NOTICE TO AIRMEN (NOTAM) SYSTEM

2.1 Time-critical aeronautical information which is of either a temporary nature or is not sufficiently known in advance to permit publication on aeronautical charts or in other operational publications, receives immediate dissemination via the National Notice to Airmen (NOTAM) System.

Note—NOTAM information is that aeronautical information that could affect a pilot's decision to make a flight. It includes such information as airport or primary runway closures, changes in the status of navigational aids, ILS, radar service availability, and other information essential to planned en route, terminal, or landing operations.

2.2 NOTAM information is classified into three categories. These are NOTAM (D) or distant, NOTAM (L) or local, and Flight Data Center (FDC) NOTAM's.

2.2.1 NOTAM (D)

2.2.1.1 NOTAM (D) information is disseminated for all navigational facilities that are part of the National Airspace System (NAS), all public use airports, seaplane bases, and heliports listed in the Airport/Facility Directory (A/FD). The complete file of all NOTAM (D) information is maintained in a computer data base at the National Communications Center (NATCOM), located in Kansas City, Missouri. This category of information is distributed automatically, appended to the hourly weather reports, via the Service A telecommunications system. Air traffic facilities, primarily FSS's, with Service A capability have access to the entire NATCOM data base of NOTAM's. These NOTAM's remain available via Service A for the duration of their validity or until published.

2.2.2 NOTAM (L)

2.2.2.1 NOTAM (L) information includes such data as taxiway closures, personnel and equipment near or crossing runways, airport rotating beacon outages, and airport lighting aids that do not affect instrument approach criteria, such as VASI.

2.2.2.2 NOTAM (L) information is distributed locally only and is not attached to the hourly weather reports. A separate file of local NOTAM's is maintained at each FSS for facilities in their area only. NOTAM (L) information for other FSS areas must be specifically requested directly from the FSS that has responsibility for the airport concerned.

Note—DUATS vendors are not required to provide NOTAM (L) information.

2.2.3 FDC NOTAM's

2.2.3.1 On those occasions when it becomes necessary to disseminate information which is regulatory in nature, the National Flight Data Center (NFDC) in Washington, D.C., will issue an FDC NOTAM. FDC NOTAM's contain such things as amendments to published IAP's and other current aeronautical charts. They are also used to advertise temporary flight restrictions caused by such things as natural disasters or large scale public events that may generate a congestion of air traffic over a site.

2.2.3.2 FDC NOTAM's are transmitted via Service A only once and are kept on file at the FSS until published or canceled. FSS's are responsible for maintaining a file of current, unpublished FDC NOTAM's concerning conditions within 400 miles of their facilities. FDC information concerning conditions that are more than 400 miles from the FSS, or that is already published, is given to a pilot only on request.

Note 1—DUATS vendors will provide FDC NOTAM's only upon site-specific requests using a location identifier.

Note 2—NOTAM data may not always be current due to the changeable nature of the National Airspace System components, delays inherent in processing the information, and occasional temporary outages of the United States NOTAM System. While en route, pilots should contact FSS's and obtain updated information for their route of flight and destination.

2.3 An integral part of the NOTAM System is the biweekly Notice to Airmen publication. Data is included in this publication to reduce congestion on the telecommunications circuits and, therefore, is not available via Service A. Once published, this information is not provided during pilot weather briefings unless specifically requested by the pilot. This publication contains two sections:

2.3.1 The first section consists of notices which meet the criteria for NOTAM (D), and are expected to remain in effect for an extended period, and FDC NOTAM's current at the time of publication. Occasionally, some NOTAM (L) and other unique information is included in this section when it will contribute to flight safety.

2.3.2 The second section contains special notices that are too long or concern a wide or unspecified geographic area and are not suitable for inclusion in the first section. The content of these notices vary widely and there are no specific criteria for their inclusion, other than their enhancement of flight safety.

2.3.3 The number of the last FDC NOTAM included in the publication is noted on the first page to aid the user in updating the listing contained, with any FDC NOTAM's which may have been issued between the cutoff date and the date the publication is received. All information contained will be carried until the information expires, is canceled, or in the case of permanent conditions, is published in other publications, such as the A/FD.

2.3.4 All new notices entered, excluding FDC NOTAM's, will be published only if the information is expected to remain in effect for at least 7 days after the effective date of the publication.

2.4 NOTAM information is not available from a Supplemental Weather Service Location (SWSL).

3. FLIGHT PLAN REQUIREMENTS

Flight plans are required for flights into airspace controlled by an ATC facility. Class A, B, C, D and E airspace is defined in

RAC 3-4. (See RAC 3.1; 3, for detailed flight plan illustration.) The types of flight plans in U.S. airspace are;

Visual Flight Rules (VFR
Defense Visual Flight Rules (DVFR
Instrument Flight rules (IFR)
Composite Flight Plan Visual-Instrument Flight Rules (VFR-IFR)
IFR flight plans requesting VFR operations

Note—ICAO flight plans are required whenever the flight intends to cross an international boundary or an oceanic CTA/FIR boundary. For flights departing U.S. airports and operate over U.S. domestic airspace and/or offshore control areas, but do not penetrate the oceanic CTA/FIR boundary or borders, a U.S. domestic flight plan is preferred.

3.1 Flight Plan—VFR Flights

3.1.1 Except for operations in or penetrating a Coastal or Domestic ADIZ or DEWIZ (see RAC 8), a flight plan is not required for VFR flight; however, it is strongly recommended that one be filed.

3.1.2 To obtain maximum benefits of the flight plan program, flight plans should be filed directly with the nearest flight service station. for your convenience, FSS's provide one-call (telephone/interphone) or one-stop (personal) aeronautical and meteorological briefings while accepting flight plans. Radio may be used to file if no other means are available. Also, some states operate aeronautical communications facilities which will accept and forward flight plans to the FSS for further handling.

3.1.3 When a "stopover" flight is anticipated to cove an extended period of time, it is recommended that a separate flight plan be filed for each "leg" when the stop is expected to be more than one hour duration.

3.1.4 Pilots are encouraged to give their departure times directly to the flight service station serving the departure airport or as otherwise indicated by the FSS when the flight plan is filed. This will ensure more efficient flight plan service and permit the FSS to advise you of significant changes in aeronautical facilities or meteorological conditions. When a VFR flight plan is filed, it will be held by the FSS until one hour after the proposed departure time and then canceled unless:

a. The actual departure time is received.

b. A revised proposed departure time is received.

c. At a time of filing, the FSS is informed that the proposed departure time will be met, but actual time cannot be given because of inadequate communications (assumed departures).

3.1.5 On pilot's request, at a location having an active tower, the aircraft identification will be forwarded by the tower to the FSS for reporting the actual departure time. This procedure should be avoided at busy airports.

3.1.6 Although position reports are not required for VFR flight plans, periodic reports to FAA Flight Service Stations along the route are good practice. Such contacts permit significant information to be passed to the transiting aircraft and also serve to check the progress of the flight should it be necessary for any reason to locate the aircraft.

Example 1:

Bonanza 31K, over Kingfisher at (time), VFR flight plan, Tulsa to Amarillo.

Example 2:

Cherokee 5123J, over Oklahoma city at (time), Shreveport to Denver, no flight plan.

3.1.7 Pilots not operating on an IFR flight plan, and when in level cruising flight, are cautioned to conform with VFR cruising altitudes appropriate to direction of flight.

3.1.8 Indicate aircraft equipment capabilities when filing VFR flight plans by appending the appropriate suffix to aircraft type in the same manner as that prescribed for IFR flight (see FLIGHT PLAN-IFR FLIGHTS 3.3.5.1 Block 3). Under some circumstances, ATC computer tapes can be useful in constructing the radar history of a downed or crashed aircraft. In each case, knowledge of the aircraft's transponder equipment is necessary in determining whether or not such computer tapes might prove effective.

3.1.9 *Flight Plan Form*

Form Approved: OMB No. 2120-0026

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

FLIGHT PLAN

(FAA USE ONLY) ☐ PILOT BRIEFING ☐ VNR ☐ STOPOVER | TIME STARTED | SPECIALIST INITIALS

1. TYPE: VFR / IFR / DVFR
2. AIRCRAFT IDENTIFICATION
3. AIRCRAFT TYPE/ SPECIAL EQUIPMENT
4. TRUE AIRSPEED — KTS
5. DEPARTURE POINT
6. DEPARTURE TIME — PROPOSED (Z) / ACTUAL (Z)
7. CRUISING ALTITUDE
8. ROUTE OF FLIGHT
9. DESTINATION (Name of airport and city)
10. EST. TIME ENROUTE — HOURS / MINUTES
11. REMARKS
12. FUEL ON BOARD — HOURS / MINUTES
13. ALTERNATE AIRPORT(S)
14. PILOT'S NAME, ADDRESS & TELEPHONE NUMBER & AIRCRAFT HOME BASE
15. NUMBER ABOARD
16. COLOR OF AIRCRAFT
17. DESTINATION CONTACT/TELEPHONE (OPTIONAL)

CIVIL AIRCRAFT PILOTS. FAR Part 91 requires you file an IFR flight plan to operate under instrument flight rules in controlled airspace. Failure to file could result in a civil penalty not to exceed $1,000 for each violation (Section 901 of the Federal Aviation Act of 1958, as amended). Filing of a VFR flight plan is recommended as a good operating practice. See also Part 99 for requirements concerning DVFR flight plans.

FAA Form 7233-1 (8-82) CLOSE VFR FLIGHT PLAN WITH ____________ FSS ON ARRIVAL

3.1.10 *Explanation of VFR Flight plan items*

Block 1. Check the type flight plan. Check both the VFR and IFR blocks if composite VFR/IFR.

Block 2. Enter your complete aircraft identification including the prefix "N" if applicable.

Block 3. Enter the designator for the aircraft or, if unknown, the aircraft manufacturer's name.

Block 4. Enter your true airspeed (TAS).

Block 5. Enter the departure airport identifier code (or the name if identifier is unknown).

Block 6. Enter the proposed departure time in Coordinated Universal Time (UTC). If airborne, specify the actual or proposed departure time as appropriate.

Block 7. Enter the appropriate VFR altitude (to assist the briefer in providing weather/wind information).

Block 8. Define the route of flight by using NAVAID identifier codes and airways.

Block 9. Enter the destination airport identifier code (or name if identifier is unknown). Include the city name (or even the state name) if needed for clarity.

Block 10. Enter your estimated time en route, in hours and minutes.

Block 11. Enter only those remarks pertinent to ATC or to the clarification of other flight plan information such as the appropriate radiotelephony (call sign) associated with the designator filled in Block 2. Items of a personal nature are not accepted.

Block 12. Specify the fuel on board, in hours and minutes.

Block 13. Specify an alternate airport if desired.

Block 14. Enter your complete name, address, and telephone number. Enter sufficient information to identify home base, airport, or operator. This information is essential in the event of search and rescue operations.

Block 15. Enter total number of persons on board including crew (POB).

Block 16. Enter the predominant color(s).

Block 17. Record the FSS name for closing the flight plan. If the flight plan is closed with a different FSS or a Air Traffic facility, state the recorded FSS name that would normally have closed your flight plan. **(Optional)**—Record a destination telephone number to assist Search and Rescue contact should you fail to report or cancel your flight plan within 1/2 hour after your estimated time of arrival (ETA). *Caution: A control tower at destination point does not automatically close VFR flight plans, it remains the responsibility of a pilot to close his own flight plan.*

Note—The information transmitted to the destination FSS will consist only of flight plans blocks 2,3,9, and 10. Estimated time en route (ETE) will be converted to the correct estimated time of arrival (ETA).

3.2 Flight Plan—Defense VFR (DVFR) FLIGHTS

VFR flights into a Coastal or Domestic ADIZ/DEWIZ are required to file DVFR flight plans for security purposes. Detailed ADIZ procedures are found in RAC 8. (See Far 99.)

3.3 Flight Plan—IFR Flights

3.3.1 *General*

3.3.1.1 Prior to departure from within, or prior to entering Class A, B, C, D and E airspace, a pilot must submit a complete flight plan and receive an air traffic clearance if weather conditions are below VFR minimums. Instrument flight plans may be submitted to the nearest Flight Service Station or the airport traffic control tower either in person or by telephone (or by radio if no other means are available). Pilots should file IFR flight plans at least 30 minutes prior to estimated time of departure to preclude possible delay in receiving a departure to preclude possible delay in receiving a departure clearance from ATC. To minimize your delay in entering a Class B, C, D or E surface area at destination when IFR weather conditions exist or are forecast at the airport, an IFR flight plan should be filed before departure. Otherwise, a 30-minute delay is not unusual in receiving an ATC clearance because of time spent in processing flight plan data. Traffic saturation frequently prevents control personnel from accepting flight plans by radio. In such cases the pilot is advised to contact the nearest flight services station for the purpose of filing the flight plan.

Note—There are several methods of obtaining IFR clearance at nontower, nonflight service stations and outlying airports. The procedure may vary due to geographical features, weather conditions, and the complexity of the ATC system. To determine the most effective means of receiving an IFR clearance, pilots should ask the nearest flight service station for the most appropriate means of obtaining the IFR clearance.

3.3.1.2 When filing an IFR flight plan for a Traffic Alert and Collision Avoidance System (TCAS)/heavy equipped aircraft, add the prefix "T" for TCAS, "H" for Heavy, or "B" for both TCAS and heavy to the aircraft type.

Example:

H/DC10/U T/B727/A B/747/R

3.3.1.3 When filing an IFR flight plan for flight in an aircraft equipped with a radar beacon transponder, DME equipment, TACAN-only equipment or an combination of both, identify equipment capability by adding a suffix to the AIRCRAFT TYPE preceded by a slant, as follows:

/X	no transponder
/T	transponder with no altitude encoding capability.
/U	transponder with altitude encoding capability.
/D	DME, no transponder.
/B	DME, transponder with no altitude encoding capability.
/A	DME, transponder with altitude encoding capability.
/M	TACAN-only, no transponder
/N	TACAN-only, transponder with no altitude encoding capability.
/P	TACAN-only, transponder with altitude encoding capability.
/C	RNAV, transponder with no altitude encoding capability.
/R	RNAV, transponder with altitude encoding capability.
/W	RNAV, no transponder.
/G	Flight Management System (FMS) and Electronic Flight Instrument System (EFIS) equipped aircraft with /R capability having a "Special Aircraft and Aircrew Authorization" issued by the FAA.

Note 1—Criteria for use of the /G designation is presently indentified only for certain /R equipped air carrier aircraft and specially qualified crews. Authorization for use of the "/G" designation is obtained through the All-Weather Operations Branch of the FAA Flight Standards Service and an air carrier's certificate holding district office.

Note 2—The use of "/G" is limited to aircraft which operate totally within airspace controlled by U.S. air traffic control facilities.

3.3.1.4 It is recommended that pilots file the maximum transponder/navigation capability of their aircraft in the equipment suffix. This will provide air traffic control with the necessary information to utilize all facets of navigational equipment and transponder capabilities available. In the case of area navigation equipped aircraft, pilots should file the /C, /R, or /W capability of the aircraft even though an RNAV route or random RNAV route has not been requested. This will ensure ATC awareness of the pilot's ability to navigate point-to-point and may by utilized to expedite the flight.

Note—The suffix is not to be added to the aircraft identification or be transmitted by radio as part of the aircraft identification.

3.3.2 *Airways/Jet Routes Depiction on Flight Plan*

3.3.2.1 It is vitally important that the route of flight be accurately and completely described in the flight plan. To simplify definition of the proposed route, and to facilitate air traffic control, pilots are requested to file via airways or jet routes established for use at the altitude or flight level planned.

3.3.2.2 If flight is to be conducted via designated airways or jet routes, describe the route by indicating the type and number designators of the airway(s) or jet route(s) requested. If more than one airway or jet route is to be used, clearly indicate points of transition. If the transition is made at an unnamed intersection, show the next succeeding NAVAID or named intersection on the intended route and the complete route from that point. Reporting points should be identified by using authorized name/code as depicted on appropriate aeronautical charts. The following two examples illustrate the need to specify the transition point when two routes share more than one transition fix.

Example 1:

ALB J37 BUMPY J14 BHM

Spelled out: From Albany, New York, via Jet Route 37, transitioning to Jet Route 14 at BUMPY intersection, thence via Jet Route 14 to Birmingham, Alabama.

Example 2:

ALB J37 ENO J14 BHM

Spelled Out: From Albany, New York, via Jet Route 37 transitioning to Jet Route 14 at Kenton VORTAC (ENO), thence via Jet Route 14 to Birmingham, Alabama.

3.3.2.2.1 The route of flight may also be described by naming the reporting points or NAVAID's over which the flight will pass, provided the points named are established for use at the altitude or flight level planned.

Example:

BWI V44 SWANN V433 DQO

Spelled Out: From Baltimore-Washington International, via Victor 44 to SWANN Intersection, transitioning to Victor 433 at SWANN, thence via V433 to Dupont.

3.3.2.2.2 When the route of flight is defined by named reporting points, whether alone or in combination with airways or jet routes, and the navigational aids (VOR, VORTAC, TACAN, LF, RBN) to be used for the flight are a combination of different types of aids, enough information should be included to clearly indicate the route requested.

Example:

LAX J5 LKV J3 GEG YXC FL 330 J500 VLR J515 YWG

Spelled Out: From Los Angeles International via Jet Route 5 Lakeview, Jet Route 3 Spokane, direct Cranbrook, British

Columbia VOR/DME, Flight Level 330, Jet Route 500 to Langruth, Manitoba VORTAC, Jet Route 515 to Winnipeg, Manitoba.

3.3.2.2.3 When filing IFR, it is to the pilot's advantage to file a "preferred route."

Note—Preferred IFR routes are described and tabulated in the Airport/Facility Directory.

3.3.2.2.4 ATC may issue Standard Instrument Departure (SID) or a Standard Terminal Arrival (STAR) as appropriate (See RAC 4).

Note—Pilots not desiring a SID/STAR should so indicate in the remark section of the flight plan as "NO SID" or "NO STAR."

3.3.3 *Direct Flights*

3.3.3.1 All or any portions of the route which will not be flown on the radials/courses of established airways or routes; e.g., direct route flights, must be defined by indicating the radio fixes over which the flight will pass. Fixes selected to define the route shall be those over which the position of the aircraft can be accurately determined. Such fixes automatically become compulsory reporting points for the flight, unless advised otherwise by ATC. Only those navigational aids established for use in a particular structure; i.e., in the Low or High structures, may be used to define the en route phase of a direct flight within that structure.

3.3.3.2 The azimuth feature of VOR aids and the azimuth and distance (DME) features of VORTAC/TACAN aids are assigned certain frequency protected areas of airspace which are intended for application to established airway and route use, and to provide guidance for planning flights outside of established airways or routes. These areas of airspace are expressed in terms of cylindrical service volume of specified dimensions called "class limits" or "categories." An operational service volume has been established for each class in which adequate signal coverage and frequency protection can be assured. To facilitate use of VOR, VORTAC, or TACAN aids, consistent with their operational service volume limits, pilot use of such aids for defining a direct route of flight in Class A, B, C, D and E airspace should not exceed the following:

(1) Operations above Flight Level 450—Use aids not more than 200 nautical miles apart. These aids are depicted on the Enroute High Altitude Chart—U.S.

(2) Operation off established routes from 18,000 feet MSL to Flight Level 450—Use aids not more than 260 nautical miles apart. These aids are depicted on the Enroute High Altitude Chart—U.S.

(3) Operation off established airways below 18,000 feet MSL—Use aids not more than 80 nautical miles apart. These aids are depicted on the Enroute Low Altitude Chart—U.S.

(4) Operation off established airways between 14,500 feet MSL and 17,999 feet MSL in the conterminous United States—(H) facilities not more than 200 NM apart may be used.

3.3.3.3 Increasing use of self-contained airborne navigational systems which do not rely on the VOR/VORTAC/TACAN system has resulted in pilot requests for direct routes which exceed NAVAID service volume limits. These direct route requests will be approved only in a radar environment, with approval based on pilot responsibility for navigation on the authorized direct route. "Radar flight following" will be provided by ATC for air traffic control purposes.

3.3.3.4. At times, ATC will initiate a direct route in a radar environment which exceeds NAVAID service volume limits. In such cases ATC will provide radar monitoring and navigational assistance as necessary.

3.3.3.5. Airway or jet route numbers, appropriate to the stratum in which operation will be conducted, may also be included to describe portions of the route to be flown.

Example:

MDW V262 BDF V10 BRL STJ SLN GCK

Spelled Out: From Chicago Midway Airport via Victor 262 to Bradford, Victor 10 to Burlington, Iowa, direct St. Joseph, Missouri, direct Salina, Kansas, direct Garden City, Kansas.

Note—When route of flight is described by radio fixes, the pilot will be expected to fly a direct course between the points named.

3.3.3.6. Pilots are reminded that they are responsible for adhering to obstruction clearance requirements on those segments of direct routes that are outside of Class A, B, C, D and E airspace. The MEA's and other altitudes shown on Low Altitude IFR Enroute Charts pertain to those route segments within Class A, B, C, D and E airspace, and those altitudes may not meet obstruction clearance criteria when operating off those routes.

3.3.4 *Area Navigation (RNAV)*

3.3.4.1 Random RNAV routes can only be approved in a radar environment. Factors that will be considered by ATC in approving random RNAV routes include the capability to provide radar monitoring and compatibility with traffic volume and flow. ATC will radar monitor each flight, however, navigation on the random RNAV route is the responsibility of the pilot.

3.3.4.2 To be certified for use in the National Airspace System, RNAV equipment must meet the specifications outlined in AC 90-45. The pilot is responsible for variations in equipment capability, and must advise ATC if a RNAV clearance can not be accepted as specified. The controller need only be concerned that the aircraft is RNAV equipped; if the flight plan equipment suffix denotes RNAV capability, the RNAV routing can be applied.

3.3.4.3 Pilots of aircraft equipped with operational area navigation equipment may file for random RNAV routes throughout the National Airspace System, where radar monitoring by ATC is available, in accordance with the following procedures.

(1) File airport to airport flight plans prior to departure.

(2) File the appropriate RNAV capability certification suffix in the flight plan.

(3) Plan the random route portion of the flight plan to begin and end over appropriate arrival/departure transition fixes or appropriate navigation aids for the altitude stratum within which the flight will be conducted. The use of normal preferred departure and arrival routes (SID/STAR), where established, is recommended.

(4) File route structure transitions to and from the random route portion of the flight.

(5) Define random routes by waypoints. File route description waypoints by using degree-distance fixes based on navigational aids which are appropriate for the altitude stratum.

(6) File a minimum of one route description waypoint for each ARTCC through whose area the random route will be flown. These waypoints must be located within 200 NM of the preceding center's boundary.

(7) File an additional route description waypoint for each turnpoint in the route.

(8) Plan additional route description waypoints as required to ensure accurate navigation via the filed route of flight. Navigation is the pilots's responsibility unless ATC assistance is requested.

(9) Plan the route of flight so as to avoid Prohibited and Restricted Airspace by 3 NM unless permission has been obtained to operate in that airspace and the appropriate ATC facilities are advised.

3.3.4.4 Pilots of aircraft equipped with latitude/longitude coordinate navigation capability independent of VOR/TACAN references may file for random RNAV routes at and above FL 390 within the conterminous United States using the following procedures.

(1) File airport to airport flight plans prior to departure.

(2) File the appropriate RNAV capability certification suffix in the flight plan.

(3) Plan the random route portion of the flight to begin and end over published departure/arrival transition fixes or appropriate navigation aids for airports without published transition procedures. The use of preferred departure and arrival routes, such as SID and STAR where established, is recommended.

(4) Plan the route of fight so as to avoid prohibited and restricted airspace by 3 NM unless permission has been obtained to operate in that airspace and the appropriate ATC facility is advised.

(5) Define the route of flight after the departure fix, including each intermediate fix (turnpoint) and the arrival fix for the destination airport, in terms of latitude/longitude coordinates plotted to the nearest minute. The arrival fix must be identified by both the latitude/longitude coordinates and a fix identifier.

Example:

a	b	c	d	e
MIA	SRQ	3407/10615	3407/11546 TNP	LAX

a. Departure airport

b. Departure fix

c. Intermediate fix (turning point)

d. Arrival fix

e. Destination airport.

(6) Record latitude/longitude coordinates by four figures describing latitude in degrees and minutes followed by a solidus and five figures describing longitude in degrees and minutes.

(7) File at FL 390 or above for the random RNAV portion of the flight.

(8) Fly all routes/route segments on Great Circle tracks.

(9) Make any in-flight requests for random RNAV clearances or route amendments to an en route ATC facility.

3.3.5 *Flight Plan Form*

Form Approved: OMB No. 2120-0026

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

FLIGHT PLAN

(FAA USE ONLY) ☐ PILOT BRIEFING ☐ VNR ☐ STOPOVER | TIME STARTED | SPECIALIST INITIALS

1. TYPE	2. AIRCRAFT IDENTIFICATION	3. AIRCRAFT TYPE/ SPECIAL EQUIPMENT	4. TRUE AIRSPEED	5. DEPARTURE POINT	6. DEPARTURE TIME		7. CRUISING ALTITUDE
					PROPOSED (Z)	ACTUAL (Z)	
☐ VFR ☐ IFR ☐ DVFR			KTS				

8. ROUTE OF FLIGHT

9. DESTINATION (Name of airport and city)	10. EST. TIME ENROUTE		11. REMARKS
	HOURS	MINUTES	

12. FUEL ON BOARD		13. ALTERNATE AIRPORT(S)	14. PILOT'S NAME, ADDRESS & TELEPHONE NUMBER & AIRCRAFT HOME BASE	15. NUMBER ABOARD
HOURS	MINUTES		17. DESTINATION CONTACT/TELEPHONE (OPTIONAL)	

16. COLOR OF AIRCRAFT

CIVIL AIRCRAFT PILOTS. FAR Part 91 requires you file an IFR flight plan to operate under instrument flight rules in controlled airspace. Failure to file could result in a civil penalty not to exceed $1,000 for each violation (Section 901 of the Federal Aviation Act of 1958, as amended). Filing of a VFR flight plan is recommended as a good operating practice. See also Part 99 for requirements concerning DVFR flight plans.

FAA Form 7233-1 (8-82) CLOSE VFR FLIGHT PLAN WITH ____________ FSS ON ARRIVAL

3.3.5.1 *Explanation of IFR Flight plan items*

Block 1. Check the type flight plan. Check both the VFR and IFR blocks if composite VFR/IFR.

Block 2. Enter your complete aircraft identification including the prefix "N" if applicable.

Block 3. Enter the designator for the aircraft or, if unknown, the aircraft manufacturer's name; e.g., Cessna, followed by a slant (/) and the transponder/DME equipment code letter; e.g., C-182U. Heavy aircraft add prefix "H" to aircraft type: Example: H/DC10/U.

Block 4. Enter your computer true airspeed (TAS). Note: If the average TAS changes plus or minus 5 percent or 10 knots, whichever is greater, advise ATC.

Block 5. Enter the departure airport identifier code (or the name if identifier is unknown). Note: Use of identifier codes will expedite the processing of your flight plan.

Block 6. Enter the proposed departure time in Coordinated Universal Time (UTC) (Z). If airborne, specify the actual or proposed departure time as appropriate.

Block 7. Enter the requested en route altitude or flight level. Note: Enter only the initial requested altitude in this block. When more than one IFR altitude or flight level is desired along the route of flight, it is best to make a subsequent request direct to the controller.

Block 8. Define the route of flight by using NAVAID identifier codes (or names if the code is unknown), airways, jet routes, and waypoints (for RNAV). Note: Use NAVAID's or Waypoints to define direct routes and radials/bearing to define other unpublished routes.

Block 9. Enter the destination airport identifier code (or name if identifier is unknown).

Block 10. Enter your estimated time en route based on latest forecast winds.

Block 11. Enter only those remarks pertinent to ATC or to the clarification of other flight plan information such as the appropriate radiotelephony (call sign) associated with the designator filled in Block 2. Items of a personal nature are not accepted. Do not assume that remarks will be automatically transmitted to every controller. Specific ATC or en route requests should be made directly to the appropriate controller.

Block 12. Specify the fuel on board, computed from the departure point.

Block 13. Specify an alternate airport if desired or required, but do not include routing to the alternate airport.

Block 14. Enter your complete name, address, and telephone number of pilot in command or, in the case of a formation flight, the information commander. Enter sufficient information to identify home base, airport, or operator. Note: This information would be essential in the event of a search and rescue operation.

Block 15. Enter the total number of persons on board including crew.

Block 16. Enter the predominant color(s).

Note—Close IFR flight plans with tower, approach control, ARTCC's, or if unable, with FSS. When landing at an airport with a functioning control tower, IFR flight plans are automatically canceled.

3.3.5.2 The information transmitted to the ARTCC for IFR Flight Plans will consist of only flight plan blocks 2, 3, 4, 5, 6, 7, 8, 9, 10, and 11.

3.3.5.3 A description of the International Flight Plan Form is contained in the International Flight Information Manual.

3.4 IFR Operations to High Altitude Destinations

3.4.1 Pilots planning IFR flights to airports located in mountainous terrain are cautioned to consider the necessity for an alternate airport even when the forecast weather conditions would technically relieve them from the requirement to file one (Reference: FAR 91.167). The FAA has identified three possible situations where the failure to plan for an alternate airport when flying IFR to such destination airport could result in a critical situation if the weather is less than forecast and sufficient fuel is not available to proceed to a suitable airport.

3.4.2 An IFR flight to an airport where the MDA's or landing visibility minimums for ALL INSTRUMENT APPROACHES are higher than the forecast weather minimums specified in FAR 91.167. For example, there are 11 high altitude airports in the United States with approved instrument approach procedures where all of the Minimum Descent Altitudes (MDA's) are greater than 2,000 feet and/or the landing visibility minimums are greater than 3 miles (Bishop, California; South Lake Tahoe, California; Ukiah, California; Aspen-Pitkin Co./Sardy Field, Colorado; Butte, Montana; Helena, Montana; Missoula, Montana; Chadron, Nebraska; Ely, Nevada; Klamath Falls, Oregon; and Omak, Washington). In the case of these 11 airports, it is possible for a pilot to elect, on the basis of forecasts, not to carry sufficient fuel to get to an alternate when the ceiling and/or visibility is actually lower than that necessary to complete the approach.

3.4.3 A small number of other airports in mountainous terrain have MDA's which are slightly (100 to 300 feet) below 2000 feet AGL. In situations where there is an option as to whether to plan for an alternate, pilots should bear in mind that just a slight worsening of the weather conditions from those forecasts could place the airport below the published IFR landing minimums.

3.4.4 An IFR flight to an airport which requires special equipment; i.e. DME, glide slope, etc., in order to make the available approaches to the lowest minimums. Pilots should be aware that all other minimums on the approach charts may require weather conditions better than those specified in FAR 91.167. An inflight equipment malfunction could result in the inability to comply with the published approach procedures or, again, in the position of having the airport below the published IFR landing minimums for all remaining instrument approach alternatives.

3.5 Composite Flight Plan (VFR/IFR Flights)

3.5.1 Flight plans which specify VFR operation for one portion of a flight, and IFR for another portion, will be accepted by the FSS at the point of departure. If VFR flight is conducted for the first portion of the flight, the pilot should report his departure time to the FSS with which he filed his VFR/IFR flight plan; and, subsequently, close the VFR portion and request ATC clearance from the FSS nearest the point at which change from VFR to IFR is proposed. Regardless of the type facility you are communicating with (FSS, center, or tower), it is the pilot's responsibility to request that facility to "CLOSE VFR FLIGHT PLAN." The pilot must remain in VFR weather conditions until operating in accordance with the IFR clearance.

3.5.2 When a flight plan indicates IFR for the first portion of flight and VFR for the latter portion, the pilot will normally be cleared to the point at which the change is proposed. Once the pilot has reported over the clearance limit and does not desire further IFR clearance, he should advise Air Traffic Control to cancel the IFR portion of his flight plan. Then, he should contact the nearest FSS to activate the VFR portion of his flight plan. If the pilot desires to continue his IFR flight plan beyond the clearance limit, he should contact Air Traffic Control at least five minutes prior to the clearance limit and request further IFR clearance. If the requested clearance is not received prior to reaching the clearance limit fix, the pilot will be expected to establish himself in a standard holding pattern on the radial/course to the fix unless a holding pattern for the clearance limit fix is depicted on a U.S. Government or commercially produced (meeting FAA requirements) Low/High Altitude Enroute, Area, or STAR chart. In this case the pilot will hold according to the depicted pattern

4. INITIATING A CHANGE TO FLIGHT PLANS ON FILE

4.1 Changes to proposed flight plans should be initiated through the Flight Service Station with which the flight plan was originally filed. if this is not possible, initiate changes through the nearest FSS or ATC facility. All changes should be initiated at least 30 minutes prior to departure to insure that the change can be effected prior to the ATC clearance delivery.

4.1.1 *Change in Proposed Departure time*

4.1.1.1 To prevent computer saturation in the en route environment, time out parameters have been established to delete non-activated proposed departure flight plans. Most centers have this parameter set so as to delete these flight plans a minimum of 1 hour after the proposed departure time. To ensure that a flight plan remains active, pilots whose actual departure time will be delayed 1 hour or more beyond their filed departure time, are requested to notify ATC of their departure time.

4.1.1.2 Due to traffic saturation, control personnel frequently will be unable to accept these revisions via radio. It is recommended that you forward these revisions to the nearest flight service station.

4.1.2 *Other Changes*

In addition to altitude/flight level, destination and/or route changes, increasing or decreasing the speed of an aircraft constitutes a change in a flight plan. Therefore, at any time the average true airspeed at cruising altitude between reporting points varies or is expected to vary from that given in the flight plan by *plus or minus 5 percent, or 10 knots, whichever is greater,* air traffic control should be advised.

5. CANCELING FLIGHT PLANS

5.1 Closing VFR and DVFR Flight Plans

A pilot is responsible for ensuring that his VFR or DVFR flight plan is canceled (See FAR 91.153). You should close your flight plan with the nearest Flight Service Station, or if one is not available you may request any ATC facility to relay your cancellation to the FSS. *Control towers do not automatically close VFR or DVFR flight plans* as they may not be aware that a particular VFR aircraft is on a flight plan. If you fail to report or cancel your flight plan within ½ hour after your ETA, search and rescue procedures are started. (See AIP section SAR.)

5.2 Canceling IFR Flight Plan

5.2.1 FAR 91.153 includes the statement "When a flight plan has been filed, the pilot in command, upon canceling or completing the flight under the flight plan, shall notify the nearest Flight Service Station or ATC facility."

5.2.2 An IFR flight plan may be canceled at any time the flight is operating in VFR conditions outside Class A airspace by the pilot stating "CANCEL MY IFR FLIGHT PLAN" to the controller or air/ground station with which he is communicating. Immediately after canceling an IFR flight plan, a pilot should take necessary action to change to the appropriate air/ground frequency, VFR radar beacon code and VFR altitude or flight level.

5.2.3 ATC separation and information services will be discontinued, including radar services (where applicable). Consequently, if the canceling flight desires VFR radar advisory service the pilot must specifically request it.

Note—Pilots must be aware that other procedures may be applicable to a flight that cancels an IFR flight plan within an area where a special program, such as a designated Terminal Radar Service Area, Class C airspace or Class B airspace, has been established.

5.2.4 If a DVFR flight plan requirement exists the pilot is responsible for filing this flight plan to replace the canceled IFR flight plan. If a subsequent IFR operation becomes necessary, a new IFR flight plan must be filed and an ATC clearance obtained before operating in IFR conditions.

5.2.5 If operating on an IFR flight plan to an airport with a functioning control tower, the flight plan is automatically closed upon landing.

5.2.6 If operating on an IFR flight plan to an airport where there is no functioning control tower, the pilot must initiate cancellation of the IFR flight plan. This can be done after landing if there is a functioning Flight Service Station or other means of direct communications with ATC. In the event there is no Flight Service Station and air/ground communications with ATC is not possible below a certain altitude, the pilot would, weather conditions permitting, cancel his IFR flight plan while still airborne and able to communicate with ATC by radio. This will not only save the time and expense of canceling the flight plan by telephone but will quickly release the airspace for use by other aircraft.

AIRPORT OPERATIONS

1. GENERAL

1.1 Increased traffic congestion, aircraft in climb and descent attitudes, and pilots preoccupation with cockpit duties are some factors that increase the hazardous accident potential near the airport. The situation is further compounded when the weather is marginal—that is, just meeting VFR requirements. Pilots must be particularly alert when operating in the vicinity of an airport. This section defines some rules, practices, and procedures that pilots should be familiar with, and adhere to, for safe airport operations.

1.2 Each airport operator regularly serving scheduled air carriers has put into use security measures designed to prevent or deter unauthorized persons from having access to "Air Operations Area." The "Air Operations Area" means any area of the airport used or intended to be used for landing, takeoff, or surface maneuvering of aircraft. Pilots are encouraged to obtain airport security instructions by posted signs or radio communication.

2. VISUAL INDICATORS AT UNCONTROLLED AIRPORTS

2.1 At those airports without an operating control tower, a segmented circle visual indicator system, if installed, is designed to provide traffic pattern information. The segmented circle system consists of the following components:

The segmented circle—Located in a position affording maximum visibility to pilots in the air and on the ground and providing a centralized location for other elements of the system.

The wind direction indicator—A wind cone, wind sock, or wind tee installed near the operational runway to indicate wind direction. The large end of the wind cone/wind sock points into the wind as does the large end (cross bar) of the wind tee. In lieu of a tetrahedron and where a wind sock or wind cone is collocated with a wind tee, the wind tee may be manually aligned with the runway in use to indicate landing direction. These signaling devices may be located in the center of the segmented circle and may be lighted for night use. Pilots are cautioned against using a tetrahedron to indicate wind direction.

The landing direction indicator—A tetrahedron is installed when conditions at the airport warrant its use. It may be used to indicate the direction of landings and takeoffs. A tetrahedron may be located at the center of a segmented circle and may be lighted for night operations. The small end of the tetrahedron points in the direction of landing. Pilots are cautioned against using a tetrahedron for any purpose other than as an indicator of landing direction. Further, pilots should use extreme caution when making runway selection by use of a tetrahedron in very light or calm wind conditions as the tetrahedron may not be aligned with the designated calm-wind runway. At airports with control towers, the tetrahedron should only be referenced when the control tower is not in operation. Tower instructions supersede tetrahedron indications.

Landing strip indicators—Installed in pairs as shown in the segmented circle diagram, and used to show the alignment of landing strips.

Traffic pattern indicators—Arranged in pairs in conjunction with landing strip indicators and used to indicate the direction of turns when there is a variation from the normal left traffic pattern. If there is no segmented circle installed at the airport, traffic pattern indicators may be installed on or near the end of the runway.

2.1.1 Preparatory to landing at an airport without a control tower, or when the control tower is not in operation, the pilot should concern himself with the indicator for the approach end of the runway to be used. When approaching for landing, all turns must be made to the left unless a traffic pattern indicator indicates that turns should be made to the right. If the pilot will mentally enlarge the indicator for the runway to be used, the base and final approach legs of the traffic pattern to be flown immediately become apparent. Similar treatment of the indicator at the departure end of the runway will clearly indicate the direction of turn after takeoff.

2.1.2 When two or more aircraft are approaching an airport for the purpose of landing, the aircraft at the lower altitude has the right of way, but it shall not take advantage of this rule to cut in front of another which is on final approach to land, or to overtake that aircraft. (Reference: FAR 91.113(f).)

2.1.3 Graphic Representation: Nontower Airports

See RAC 3.2, Appendix One.

3. OPERATIONS AT TOWER CONTROLLED AIRPORTS

Towers have been established to provide for a safe, orderly, and expeditious flow of traffic on and in the vicinity of an airport. When the responsibility has been so delegated, towers also provide for the separation of IFR aircraft in the terminal areas (Approach Control).

3.1 When operating at an airport where traffic control is being exercised by a control tower, pilots are required to maintain twoway radio contact with the tower while operating within the Class B, Class C, and Class D surface area unless the tower authorizes otherwise. Initial callup should be made about 15 miles from the airport. Unless there is a good reason to leave the tower frequency before exiting the Class B, Class C, and Class D surface area, it is a good operating practice to remain on the tower frequency for the purpose of receiving traffic information. In the interest of reducing tower frequency congestion, pilots are reminded that it is not necessary to request permission to leave the tower frequency once outside of Class B, Class C, and Class D surface area. Not all airports with an operating control tower will have Class D airspace. These airports do not have weather reporting which is a requirement for surface based controlled airspace, previously known as a control zone. The controlled airspace over these airports will normally begin at 700 feet or 1200 feet above ground level and can be determined from the visual aeronautical charts. Pilots are expected to use good operating practices and communicate with the control tower as described in this section.

3.2 When necessary, the tower controller will issue clearances or other information for aircraft to generally follow the desired flight path (traffic pattern) when flying in the Class D airspace, and the proper taxi routes when operating on the ground. If not otherwise authorized or directed by the tower, pilots approach to land in an airplane must circle the airport to the left, and pilots approaching to land in a helicopter must avoid the flow of fixed wing traffic. However, an appropriate clearance must be received from the tower before landing.

3.3 The following terminology for the various components of a traffic pattern has been adopted as standard for use by control towers and pilots:

Upwind leg—A flight path parallel to the landing runway in the direction of landing.

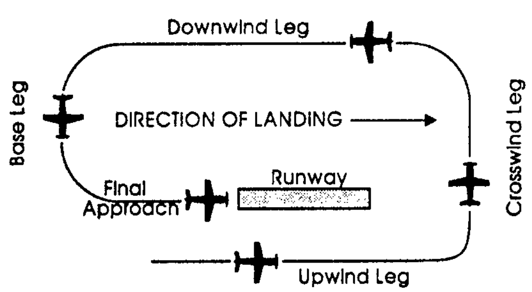
Crosswind leg—A flight path a right angles to the landing runway off its takeoff end.

Downwind leg—A flight path parallel to the landing runway in the opposite direction of landing.

Base leg—A flight path at right angles to the landing runway off its approach end and extending from the downwind leg to the intersection of the extended runway center line.

Final approach—A flight path in the direction of landing along the extended runway center line from the base leg to the runway.

3.4 Graphic Representation: Tower Airports



Note. — This diagram is intended only to illustrate terminology used in identifying various components of a traffic pattern. It should not be used as a reference or guide on how to enter a traffic pattern.

3.5 Many towers are equipped with a tower radar display. The radar uses are intended to enhance the effectiveness and efficiency of the local control, or tower, position. They are not intended to provide radar services or benefits to pilots except as they may accrue through a more efficient tower operation. The four basic uses are:

3.5.1 To determine an aircraft's exact location—This is accomplished by radar identifying the VFR aircraft through any of the techniques available to a radar position; such as having the aircraft ident. Once identified, the aircraft's position and spatial relationship to other aircraft can be quickly determined, and standard instructions regarding VFR operation in the aircraft traffic area will be issued. Once initial radar identification of a VFR aircraft has been established and the appropriate instructions have been issued, radar monitoring may be discontinued. The reason being that the local controller's primary means of surveillance in VFR conditions is usually scanning the airport and local area.

3.5.2 To provide radar traffic advisories—Radar traffic advisories may be provided to the extent that the local controller is able to monitor the radar display. Local control has primary control responsibilities to the aircraft operating on the runways which will normally supersede radar monitoring duties.

3.5.3 To provide a direction or suggested heading—The local controller may provide pilots flying VFR with generalized instructions which will facilitate operations; e.g., "PROCEED SOUTHWEST BOUND, ENTER A RIGHT DOWNWIND RUNWAY THREE ZERO;" or provide a suggested heading to establish radar identification or as an advisory aid to navigation; e.g., "SUGGESTED HEADING TWO TWO ZERO, FOR RADAR IDENTIFICATION." In both cases, the instructions are advisory aids to the pilot flying VFR and are not radar vectors. PILOTS HAVE COMPLETE DISCRETION REGARDING ACCEPTANCE OF THE SUGGESTED HEADING OR DIRECTION AND HAVE SOLE RESPONSIBILITY FOR SEEING AND AVOIDING OTHER AIRCRAFT.

3.5.4 To provide information and instructions to aircraft operating within Class D airspace—In an example of this situation, the local controller would use the radar to advise a pilot on an extended downwind when to turn base leg.

Note. — The above tower radar applications are intended to augment the standard functions of the local control position. There is no controller requirement to maintain constant radar identification and, in fact, such a requirement could compromise the local controller's ability to visually scan the airport and local area to meet FAA responsibilities to the aircraft operating on the runways and within Class D airspace. Normally, pilots will not be advised of being in radar contact since that continued status cannot be guaranteed and since the purpose of the radar identification is not to establish a link for the provision of radar services.

3.5.5 A few of the radar-equipped towers are authorized to use the radar to ensure separation between aircraft in specific situations, while still others may function as limited radar approach controls. The various radar uses are strictly a function of FAA operational need. The facilities may be indistinguishable to pilots since they are all referred to as tower and no publication lists the degree of radar use. Therefore, WHEN IN COMMUNICATION WITH A TOWER CONTROLLER WHO MAY HAVE RADAR AVAILABLE, DO NOT ASSUME THAT CONSTANT RADAR MONITORING AND COMPLETE ATC RADAR SERVICES ARE BEING PROVIDED.

3.6 Ground Control Frequencies

3.6.1 The majority of ground control frequencies are in the 121.6-121.9 MHz bandwidth. Ground control frequencies are provided to eliminate frequency congestion on the tower (local control) frequency and are limited to communications between the tower and aircraft on the ground and between the tower and utility vehicles on the airport, provide a clear VHF channel for arriving and departing aircraft. They are used for issuance of taxi information, clearances, and other necessary contacts between the tower and aircraft or other vehicles operated on the airport. A pilot who has just landed should not change from the tower frequency to the ground control frequency until he is directed to do so by the controller. Normally, only one ground control frequency is assigned at an airport; however, at locations where the amount of traffic so warrants, a second ground control frequency and/or another frequency designated as a clearance delivery frequency may be assigned.

3.6.2 A controller may omit the ground or local frequency if the controller believes the pilot knows which frequency is in use. If the ground control frequency is in the 121 MHz bandwidth, the controller may omit the numbers preceding the decimal point; e.g., 121.7, "CONTACT GROUND POINT SEVEN." However, if any doubt exists as to what frequency is in use, the pilot should promptly request the controller to provide that information.

3.6.3 Controllers will normally avoid issuing a radio frequency change to helicopters, known to be single-piloted, which are hovering, air taxiing, or flying near the ground. At times, it may be necessary for pilots to alert ATC regarding single pilot operations to minimize delay of essential ATC communications. Whenever possible, ATC instructions will be relayed through the frequency being monitored until a frequency change can be accomplished. You must promptly advise ATC if you are unable to comply with a frequency change. Also, you should advise ATC if you must land to accomplish the frequency change unless it is clear the landing, e.g., on a taxiway or in a helicopter operating area, will have no impact on other air traffic

3.7 Tower Control Light Signals

3.7.1 The following procedures are used by airport traffic control towers in the control of aircraft, ground vehicles, equipment, and personnel not equipped with radio. These same procedures will be used to control aircraft, ground vehicles, equipment, and personnel equipped with radio if radio contact cannot be established. Airport traffic control personnel use a directive traffic control signal which emits an intense narrow beam of a selected color (either red, white, or green) when controlling traffic by light signals.

3.7.2 Although the traffic signal light offers the advantage that some control may be exercised over nonradio-equipped aircraft, pilots should be cognizant of the disadvantages which are:

3.7.2.1 The pilot may not be looking at the control tower at the time a signal is directed toward him.

3.7.2.2 The directions transmitted by a light signal are very limited since only approval of a pilot's anticipated actions may be transmitted. No supplement or explanatory information may be transmitted except by the use of the "General Warning Signal" which advises the pilot to be on the alert.

3.7.3 Between sunset and sunrise, a pilot wishing to attract the attention of the control tower should turn on a landing light and taxi the aircraft into a position, clear of the active runway, so that light is visible to the tower. The landing light should remain on until appropriate signals are received from the tower.

3.7.4 Air Traffic Control Tower Light Gun Signals:

COLOR AND TYPE OF SIGNAL	MOVEMENT OF VEHICLES EQUIPMENT AND PERSONNEL	AIRCRAFT ON THE GROUND	AIRCRAFT IN FLIGHT
Steady green	Cleared to cross, proceed, or go	Cleared for takeoff	Cleared to land
Flashing green	Not applicable	Cleared for taxi	Return for landing (to be followed by steady green at the proper time)
Steady red	STOP	STOP	Give way to other aircraft and continue circling
Flashing red	Clear the taxiway/runway	Taxi clear of the runway in use	Airport unsafe, do not land
Flashing white	Return to starting point on airport	Return to starting point on airport	Not applicable
Alternating red and green	Exercise extreme caution	Exercise extreme caution	Exercise extreme caution

3.7.5 During daylight hours, acknowledge tower transmissions or light signals by moving the ailerons or rudder. At night, acknowledge by blinking the landing or navigation lights. If radio malfunction occurs after departing the parking area, watch the tower for light signals or monitor tower frequency.

3.8 Communications With Tower When Aircraft Transmitter/Receiver or Both Are Inoperative

3.8.1 Arriving Aircraft

3.8.1.1 **Receiver inoperative**—If you have reason to believe your receiver is inoperative, remain outside or above Class D airspace until the direction and flow of traffic has been determined; then, advise the tower of your type aircraft, position, altitude, intention to land, and request that you be controlled with light signals. When you are approximately 3 to 5 miles from the airport, advise the tower of your position and join the airport traffic pattern. From this point on, watch the tower for light signals. Thereafter, if a complete pattern is made, transmit your position when downwind and/or turning base leg.

3.8.1.2 **Transmitter inoperative**—Remain outside or above Class D airspace until the direction and flow of traffic has been determined, then join the airport traffic pattern. Monitor the primary local control frequency as depicted on Sectional Charts for landing or traffic information, and look for a light signal which may be addressed to your aircraft. During hours of daylight, acknowledge tower transmissions or light signals by rocking your wings. At night, acknowledge by blinking the landing or navigational lights.

Note. — To acknowledge tower transmissions during daylight hours, hovering helicopters will turn in the direction of the controlling facility and flash the landing light. While in flight, helicopters should show their acknowledgment of receiving a transmission by making shallow banks in opposite directions. At night, helicopters will acknowledge receipt of transmissions by flashing either the landing or the search light.

3.8.1.3 Transmitter and receiver inoperative—Remain outside or above Class D airspace until the direction and flow of traffic has been determined, then join the airport traffic pattern and maintain visual contact with tower to receive light signals.

3.8.2 Departing Aircraft

3.8.2.1 If you experience radio failure prior to leaving the parking area, make every effort to have the equipment repaired. If you are unable to have the malfunction repaired, call the tower by telephone and request authorization to depart without two-way radio communications. If tower authorization is granted, you will be given departure information and requested to monitor the tower frequency or watch for light signals, as appropriate. During daylight hours, acknowledge tower transmissions or light signals by moving the ailerons or rudder. At night, acknowledge by blinking the landing or navigation lights. If radio malfunction occurs after departing the parking area, watch the tower for light signals or monitor tower frequency.

4. AIRPORT TRAFFIC PATTERNS

4.1 At most airports and military air bases, traffic pattern altitudes for propeller driven aircraft generally extend from 600 feet to as high as 1,500 feet above the ground. Also traffic pattern altitudes for military turbojet aircraft sometimes extend up to 2,500 feet above the ground. Therefore, pilots of en route aircraft should be constantly on the alert for other aircraft in traffic patterns and avoid these areas whenever possible. Traffic pattern altitudes should be maintained unless otherwise required by the applicable distance from cloud criteria (FAR 91.155).

4.2 Unexpected Maneuvers in Traffic Patterns

There have been several incidents in the vicinity of controlled airports that were caused primarily by aircraft executing unexpected maneuvers. ATC service is based upon observed or known traffic and airport conditions. Controllers establish the sequence of arrive and departing aircraft by requiring them to adjust flight as necessary to achieve proper spacing. These adjustments can only be based on observed traffic, accurate pilot reports, and anticipated aircraft maneuvers. Pilots are expected to cooperate so as to preclude disruption of traffic flow or creation of conflicting patterns. The pilot in command of an aircraft is directly responsible for and is the final authority as to the operation of that aircraft. On occasion it may be necessary for a pilot to maneuver his aircraft to maintain spacing with the traffic he has been sequenced to follow. The controller can anticipate minor maneuvering such as shallow "S" turns. The controller cannot, however, anticipate a major maneuver such as a 360 degree turn. If a pilot makes a 360 degree turn after he has obtained a landing sequence, the result is usually a gap in the landing interval and more importantly it causes a chain reaction which may result in a conflict with following traffic and interruption of the sequence established by the tower or approach controller. Should a pilot decide he needs to make maneuvering turns to maintain spacing behind a preceding aircraft, he should always advise the controller if at all possible. Except when requested by the controller or in emergency situations, a 360 degree turn should never be executed in the traffic pattern or when receiving radar service without first advising the controller.

5. RUNWAY USAGE

5.1 Runways are identified by numbers which indicate the nearest 10-degree increment of the azimuth of the runway centerline. For example, where the magnetic azimuth is 183 degrees, the runway designation would be 18; for a magnetic azimuth of 87 degrees, the runway designation would be 9. For a magnetic azimuth ending in the number 5, such as 185, the runway designation could be either 18 or 19. Wind direction issued by the tower is also magnetic and wind velocity is in knots.

5.2 Airport proprietors are responsible for taking the lead in local aviation noise control. Accordingly, they may propose specific noise abatement plans to the FAA. If approved, these plans are applied in the form of Formal or Informal Runway Use Programs for noise abatement purposes.

5.2.1 At airports where no runway use program is established, ATC clearance may specify:

a. The runway most nearly aligned with the wind when it is five knots or more;

b. The "calm wind" runway when wind is less than five knots, or;

c. Another runway if operationally advantageous.

Note. — It is not necessary for a controller to specifically inquire if the pilot will use a specific runway or to offer him a choice of runways. If a pilot prefers to use a different runway than that specified or the one most nearly aligned with the wind, he is expected to inform ATC accordingly.

5.2.2 At airports where a runway use program is established, ATC will assign runways deemed to have the least noise impact. If in the interest of safety a runway different than that specified is preferred, the pilot is expedited to advise ATC accordingly. ATC will honor such requests and advise pilots when the requested runway is noise sensitive. When use of a runway other that the one assigned is requested, pilot cooperation is encouraged to preclude disruption of traffic flows or creation of conflicting patterns.

5.3 At some airports, the airport proprietor may declare that sections of a runway at one or both ends are not available for landing or takeoff. For these airports, the declared distance of runway length available for a particular operation is published in the Airport/Facility Directory. Declared distances TORA, TODA, ASDA, and LDA are defined in the Pilot/Controller Glossary. These distances are calculated by adding to the full length of paved runway any applicable clearway or stopway and subtracting from that sum the sections of the runway unsuitable for satisfying the required takeoff run, takeoff, accelerate/stop, or landing distance.

6. LOW LEVEL WIND SHEAR ALERT SYSTEM (LLWAS)

6.1 This computerized system detects the presence of a possible hazardous low level wind shear by continuously comparing the winds measured by sensors installed around the periphery of an airport with the wind measured at the centerfield location. If the difference between the centerfield wind sensor and a peripheral wind sensor becomes excessive, a thunderstorm or thunderstorm gust front wind shear is probable. When this condition exists, the tower controller will provide arrival and departure aircraft with an advisory of the situation which includes the centerfield wind plus the remote site location and wind.

6.2 Since the sensors are not all associated with specific runways, descriptions of the remote sites will be based on an eight point compass system. For example: "Delta One Twenty Four, centerfield wind two seven zero at one zero. South boundary wind one four zero at three zero."

6.3 An airport equipped with the Low Level Wind Shear Alert System (LLWAS) is so indicated in the Airport/Facility Directory under "Weather Data Sources" for that particular airport.

7. BRAKING ACTION

7.1 Braking Action Reports And Advisories

7.1.1 When available, ATC furnishes pilots the quality of braking action received from pilots or airport management. The quality of braking action is described by the terms "good," "fair," "poor," and "nil," or a combination of these terms. When pilots report the quality of braking action by using the terms noted above, they should use descriptive terms that are easily understood, such as, "braking action poor the first/last half of the runway," together with the particular type of aircraft.

7.1.2 For NOTAM purposes, braking action reports are classified according to the most critical term used. Reports containing the term "fair" are classified as NOTAM(L). Reports containing the terms "poor" or "nil" are classified as NOTAM(D).

7.2.3 When tower controllers have received runway braking action reports which include the terms "poor" or "nil" or whenever weather conditions are conducive to deteriorating or rapidly changing runway braking conditions, the tower will include on the ATIS broadcast the statement. "BRAKING ACTION ADVISORIES ARE IN EFFECT."

7.2.4 During the time that Braking Action Advisories are in effect, ATC will issue the latest braking action report for the runway in use to each arriving and departing aircraft. Pilots should be prepared for deteriorating braking conditions and should request current runway condition information if not volunteered by controllers. Pilots should also be prepared to provide a descriptive runway condition report to controllers after landing.

7.2 Runway Friction Reports And Advisories

7.2.1 Friction is defined as the ratio of the tangential force needed to maintain uniform relative motion between two contacting surfaces (aircraft tires to the pavement surface) to the perpendicular force holding them in contact (distributed aircraft weight to the aircraft tire area). Simply stated, friction quantifies slipperiness of pavement surfaces.

7.2.2 The greek letter MU (pronounced "myew"), is used to designate a friction value representing runway surface conditions.

7.2.3 MU (friction) values range from 0 to 100 where zero is the lowest friction value and 100 is the maximum friction value obtainable. For frozen contaminants on runway surfaces, a MU value of 40 or less is the level when the aircraft braking performance starts to deteriorate and directional control begins to be less responsive. The lower the MU value, the less effective braking performance becomes and the more difficult directional control becomes.

7.2.4 At airports with friction measuring devices, airport management should conduct friction measurements on runways covered with compacted snow and/or ice.

(1) Numerical readings may be obtained by using any FAA approved friction measuring device. It is not necessary to designate the type of friction measuring device since they provide essentially the same numerical reading when the values are 40 or less.

(2) When the MU value for any one-third zone of an active runway is 40 or less, a report should be given to ATC by airport management for dissemination to pilots. The report will identify the runway, the time of measurement, MU values for each zone, and the contaminant conditions, e.g., wet snow, dry snow, slush, deicing chemicals, etc. Measurements for each one-third zone will be given in the direction of takeoff and landing on the runway. A report should also be given when MU values rise above 40 in all zones of a runway previously reporting a MU below 40.

(3) Airport management should initiate a NOTAM(D) when the friction measuring device is out of service.

7.2.5 When MU reports are provided by airport management, the ATC facility providing approach control or local airport advisory will provide the report to any pilot upon request.

7.2.6 Pilots should use MU information with other knowledge including aircraft performance characteristics, type, and weight, previous experience, wind conditions, and aircraft tire type (i.e., bias ply vs. radial constructed) to determine runway suitability.

7.2.7 No correlation has been established between MU values and the descriptive terms "good," "fair," "poor," and "nil" used in braking action reports.

8. COMMUNICATIONS PRIOR TO DEPARTURE

8.1 Nontower Controlled Airports

8.1.1 At airports not served by a Flight Service Station located on the airport, the pilot in command should broadcast his intentions on the prescribed frequency prior to aircraft movement and departure.

8.1.2 At airports served by a Flight Service Station located on the airport, the pilot in command should obtain airport advisory service prior to aircraft movement and departure.

8.1.3 Aircraft departing on an IFR clearance must obtain the clearance prior to departure via telephone, the appropriate Flight Service station, or via direct communications with the ATC facility issuing the clearance as appropriate. An IFR clearance does not relieve the pilot from the communication stated above prior to aircraft movement and departure.

8.2 Tower Controlled Airports

8.2.1 Pilots of departing aircraft should communicate with the control tower on the appropriate ground control/clearance delivery frequency prior to starting engines to receive engine start time, taxi, and/or clearance information. Unless otherwise advised by the tower, remain on the frequency during taxiing and run up, then change to local control frequency when ready to request takeoff clearance.

Note. — Refer to Automatic Terminal Information Service (ATIS) for continuous broadcast of terminal information.

8.2.1.1 Gate Holding Due to Departure Delays

Pilots should contact ground control/clearance delivery prior to starting engines as gate hold procedures will be in effect whenever departure delays exceed or are anticipated to exceed 15 minutes. The sequence for departure will be maintained in accordance with initial call up unless modified by flow control restrictions. Pilots should monitor the ground control/clearance delivery frequency for engine startup advisories or new proposed start time if the delay changes.

8.2.2 The tower controller will consider that pilots of turbine-powered aircraft are ready for takeoff when they reach the runway/warm-up block unless advised otherwise.

9. TAXIING PROCEDURES

9.1 General: Approval must be obtained prior to moving an aircraft or vehicle onto the movement area during the hours an airport traffic control tower is in operation.

9.1.1 Always state your position on the airport when calling the tower for taxi instructions.

9.1.2 The movement area is normally described in local bulletins issued by the airport manager or control tower. These bulletins may be found in FSS's, fixed base operators offices, air carrier offices, and operations offices.

9.1.3 The control tower also issues bulletins describing areas where they cannot provide airport traffic control service due to nonvisibility or other reasons.

9.1.4 A clearance must be obtained prior to taxiing on a runway, taking off, or landing during the hours an airport traffic control tower is in operation.

9.1.5 When ATC clears an aircraft to "taxi to" an assigned takeoff runway, the absence of holding instructions authorizes the aircraft to "cross" all runways which the taxi route intersects except the assigned takeoff runway. It does not include authorization to "taxi onto" or "cross" the assigned takeoff runway at any point. In order to preclude misunderstandings in radio communications, ATC will not use the word "cleared" in conjunction with authorization for aircraft to taxi.

9.1.6 In the absence of holding instructions, a clearance to "taxi to" any point other than an assigned takeoff runway is a clearance to cross all runways that intersect the taxi route to that point.

9.1.7 Air traffic control will first specify the runway, issue taxi instructions, and then state any required hold short instructions, when authorizing an aircraft to taxi for departure. This does not authorize the aircraft to "enter" or "cross" the assigned departure runway at any point. AIR TRAFFIC CONTROLLERS ARE REQUIRED TO OBTAIN FROM THE PILOT A READBACK OF ALL RUNWAY HOLD SHORT INSTRUCTIONS.

9.2 ATC clearances or instructions pertaining to taxiing are predicated on known traffic and known physical airport conditions. Therefore, it is important that pilots clearly understand the clearance or instruction. Although an ATC clearance is issued for taxiing purposes, when operating in accordance with the FAR's, it is the responsibility of the pilot to avoid collision with other aircraft. Since "the pilot in command of an aircraft is directly responsible for, and is the final authority as to, the operation of that aircraft" the pilot should obtain clarification of any clearance or instruction which is not understood. (See MET-0;10.1)

9.2.1 Good operating practice dictates that pilots acknowledge all runway crossing, hold short, or takeoff clearances unless there is some misunderstanding, at which time the pilot should query the controller until the clearance is understood. AIR TRAFFIC CONTROLLERS ARE REQUIRED TO OBTAIN FROM THE PILOT A READBACK OF ALL RUNWAY HOLD SHORT INSTRUCTIONS. Pilots operating a single pilot aircraft should monitor only assigned ATC communications after being cleared onto the active runway for departure. Single pilot aircraft should not monitor other than ATC communications until flight from Class D airspace is completed. This same procedure should be practiced from after receipt of the clearance for landing until the landing and taxi activities are complete. Proper effective scanning for other aircraft, surface vehicles, or other objects should be continuously exercised in all cases.

9.2.2 If the pilot is unfamiliar with the airport or for any reason confusion exists as to the correct taxi routing, a request may be made for progressive taxi instructions which include step-by-step routing directions. Progressive instructions may also be issued if the controller deems it necessary due to traffic or field conditions; i.e., construction or closed taxiways.

9.3 At those airports where the United States Government operates the control tower and ATC has authorized noncompliance with the requirement for two-way radio communications while operating within Class D airspace, or at those airports where the United States Government does not operate the control tower and radio communications cannot be established, pilots shall obtain a clearance by visual light signal prior to taxiing on a runway and prior to takeoff and landing.

9.4 1The following phraseologies and procedures are used in radio-telephone communications with aeronautical ground stations.

9.4.1 Request for taxi instructions prior to departure— State your aircraft identification, location, type of operation planned (VFR or IFR), and the point of first intended landing.

Example:

Aircraft: "WASHINGTON GROUND, BEECHCRAFT ONE THREE ONE FIVE NINER AT HANGAR EIGHT, READY TO TAXI, IFR TO CHICAGO."

Tower: "BEECHCRAFT ONE THREE ONE FIVE NINER, WASHINGTON GROUND, TAXI TO RUNWAY THREE SIX, WIND ZERO THREE ZERO AT TWO FIVE, ALTIMETER THREE ZERO ZERO FOUR,"

or

Tower: "BEECHCRAFT ONE THREE ONE FIVE NINER, WASHINGTON GROUND, RUNWAY TWO SEVEN, TAXI VIA TAXIWAYS CHARLIE AND DELTA, HOLD SHORT OF RUNWAY THREE THREE LEFT."

Aircraft: "BEECHCRAFT ONE THREE ONE FIVE NINER, HOLD SHORT OF RUNWAY THREE THREE LEFT."

9.4.2 Receipt of air traffic control clearance—Air route traffic control clearances are relayed to pilots by airport traffic controllers in the following manner:

Example:

Tower: "BEECHCRAFT ONE THREE ONE FIVE NINER, CLEARED TO THE CHICAGO MIDWAY AIRPORT VIA VICTOR EIGHT, MAINTAIN EIGHT THOUSAND."

Aircraft: "BEECHCRAFT ONE THREE ONE FIVE NINER, CLEARED TO THE CHICAGO MIDWAY AIRPORT VIA VICTOR EIGHT, MAINTAIN EIGHT THOUSAND."

Note. — Normally, an ATC IFR clearance is relayed to a pilot by the ground controller. At busy locations, however, pilots may be instructed by the ground controller to "CONTACT CLEARANCE DELIVERY" on a frequency designated for this purpose. No surveillance or control over the movement of traffic is exercised by this position of operation. (See RAC 3.3)

9.4.3 Request for taxi instructions after landing—State your aircraft identification, location, and that you request taxi instructions.

Example:

Aircraft: "DULLES GROUND, BEECHCRAFT ONE FOUR TWO SIX ONE CLEARING RUNWAY ONE RIGHT ON TAXIWAY ECHO THREE, REQUEST CLEARANCE TO PAGE."

Tower: "BEECHCRAFT ONE FOUR TWO SIX ONE, DULLES GROUND, TAXI TO PAGE VIA TAXIWAYS ECHO THREE, ECHO ONE, AND ECHO NINER."

or

Aircraft: "ORLANDO GROUND, BEECHCRAFT ONE FOUR TWO SIX ONE CLEARING RUNWAY ONE EIGHT LEFT AT TAXIWAY BRAVO THREE, REQUEST CLEARANCE TO PAGE."

Tower: "BEECHCRAFT ONE FOUR TWO SIX ONE, ORLANDO GROUND, HOLD SHORT OF RUNWAY ONE EIGHT RIGHT."

Aircraft: "BEECHCRAFT ONE FOUR TWO SIX ONE, HOLD SHORT OF RUNWAY ONE EIGHT RIGHT."

9.5 Taxi During Low Visibility

9.5.1 Pilots and aircraft operators should be constantly aware that during certain low visibility conditions the movement of aircraft and vehicles on airports may not be visible to the tower controller. This may prevent visual confirmation of an aircraft's adherence to taxi instructions. Pilots should, therefore, exercise extreme vigilance and proceed cautiously under such conditions.

9.5.2 Of vital importance is the need for pilots to notify the controller when difficulties are encountered or at the first indication of becoming disoriented. Pilots should proceed with extreme caution when taxiing toward the sun. When vision difficulties are encountered pilots should immediately inform the controller.

10. INTERSECTION TAKEOFFS

10.1 In order to enhance airport capacities, reduce taxiing distances, minimize departure delays, and provide for more efficient movement of air traffic, controllers may initiate intersection takeoffs as well as approve them when the pilot requests. If for ANY reason a pilot prefers to use a different intersection or the full length of the runway or desires to obtain the distance between the intersection and the runway end, HE IS EXPECTED TO INFORM ATC ACCORDINGLY.

10.2 An aircraft is expected to taxi to (but not onto) the end of the assigned runway unless prior approval for an intersection departure is received from ground control.

10.3 Pilots should state their position on the airport when calling the tower for takeoff from a runway intersection.

Example:

CLEVELAND TOWER, APACHE 3722P, AT THE INTERSECTION OF TAXIWAY OSCAR AND RUNWAY TWO THREE RIGHT, READY FOR DEPARTURE.

10.4 Controllers are required to separate small aircraft (12,500 pounds or less maximum certificated takeoff weight) departing (same or opposite direction) from an intersection behind a large nonheavy aircraft on the same runway by ensuring that at least a 3-minute interval exists between the time the preceding large aircraft has taken off and the succeeding small aircraft begins takeoff roll. To inform the pilot of the required 3-minute hold, the controller will state, "Hold for wake turbulence." If after considering wake turbulence hazards, the pilot feels that a lesser time interval is appropriate, he may request a waiver to the 3-minute interval. Pilots must initiate such a request by stating, "Request waiver to 3-minute interval," or by making a similar statement. Controllers may then issue a takeoff clearance if other traffic permits, since the pilot has accepted responsibility for his own wake turbulence separation.

10.5 The 3-minute interval is not required when the intersection is 500 feet or less from the departure point of the preceding aircraft and both aircraft are taking off in the same direction. Controllers may permit the small aircraft to alter course after takeoff to avoid the flight path of the preceding departure.

10.6 The 3-minute interval is mandatory behind a heavy aircraft in all cases

11. RESERVED

12. AIRPORT OPERATIONS FOR ARRIVING AIRCRAFT

12.1 VFR Flights in Terminal Areas

Use reasonable restraint in exercising the prerogative of VFR flight, especially in terminal areas. The weather minimums and distances from clouds are minimums. Giving yourself a greater margin in specific instances is just good judgment.

12.1.1 Approach Area

Conducting a VFR operation in Class D and E Airspace when the official visibility is 3 or 4 miles is not prohibited, but good judgment would dictate that you keep out of the approach area.

12.1.2 Reduced Visibility

It has always been recognized that precipitation reduces forward visibility. Consequently, although again it may be perfectly legal to cancel your IFR flight plan at any time you can proceed VFR, it is good practice, when precipitation is occurring, to continue IFR operation into a terminal area until you are reasonably close to your destination.

12.1.3 Simulated Instrument Flights

In conducting simulated instrument flights, be sure that the weather is good enough to compensate for the restricted visibility of the safety pilot and your greater concentration on your flight instruments. Give yourself a little greater margin when your flight plan lies in or near a busy airway or close to an airport.

12.2 VFR Approach Maneuvers

12.2.1 Low Approach

12.2.1.1 A low approach (sometimes referred to as a low pass) is the go-around maneuver following approach. Instead of landing or making a touch-and-go, a pilot may wish to go around (low approach) in order to expedite a particular operation—a series of practice instrument approaches is an example of such an operation. Unless otherwise authorized by ATC, the low approach should be made straight ahead with no turns or climb made until the pilot has made a thorough visual check for other aircraft in the area.

12.2.1.2 When operating within Class D airspace, a pilot intending to make a low approach should contact the tower for approval. This request should be made prior to starting the final approach.

12.2.1.3 When operating to an airport within Class E airspace, a pilot intending to make low approach should, prior to leaving the final approach fix inbound (nonprecision approach) or the outer marker or fix used in lieu of the outer marker inbound (precision approach), so advise the FSS, UNICOM, or make a broadcast as appropriate.

12.2.2 Practice Instrument Approaches

12.2.2.1 Various air traffic incidents required adoption of measures to achieve more organized and controlled operations where practice instrument approaches are conducted. Practice instrument approaches are considered to be instrument approaches made by either a VFR aircraft not on an IFR flight plan or an aircraft on an IFR flight plan. To achieve this and thereby enhance air safety, it is Air Traffic Operations Service policy to provide for separation of such operations at locations where approach control facilities are located and, as resources permit, at certain other locations served by Air Route Traffic Control Centers or approach control facilities. Pilot requests to practice instrument approaches may be approved by ATC subject to traffic and workload conditions. Pilots should anticipate that in some instances the controller may find it necessary to deny approval or withdraw previous approval when traffic conditions warrant. It must be clearly understood, however, that even though the controller may be providing separation, pilots on VFR flight plans are required to comply with basic visual flight rules (FAR 91.155). Application of ATC procedures or any action taken by the controller to avoid traffic conflictions does not relieve IFR and VFR pilots of their responsibility to see and avoid other traffic while operating in VFR conditions (FAR 91.113). In addition to the normal IFR separation minimums (which includes visual separation) during VFR conditions, 500 feet vertical separation may be applied between VFR aircraft and between a VFR aircraft and an IFR aircraft. Pilots not on IFR flight plans desiring practice instrument approaches should always state "practice" when making requests to ATC. Controllers will instruct VFR aircraft requesting an instrument approach to maintain VFR. This is to preclude misunderstandings between the pilot and controller as to the status of the aircraft. If the pilot wishes to proceed in accordance with instrument flight rules, he must specifically request and obtain an IFR clearance.

12.2.2.2 Before practicing an instrument approach, pilots should inform the approach control facility or the tower of the type of practice approach they desire to make and how they intend to terminate it; i.e., full-stop landing, touch-and-to, or missed/low approach maneuver. This information may be furnished progressively when conducting a series of approaches. Pilots on an IFR flight plan, who have made a series of instrument approaches to full stop landings, should inform ATC when they make their final landing. The controller will control flights practicing instrument approaches so as to ensure that they do not disrupt the flow of arriving and departing itinerant IFR or VFR aircraft. The priority afforded itinerant aircraft over practice instrument approaches is not intended to be so rigidly applied that it causes a grossly inefficient application of services. A minimum delay to itinerant traffic may be appropriate to allow an aircraft practicing an approach to complete that approach.

Note. — A clearance to land means that appropriate separation on the landing runway will be ensured. A landing clearance does not relieve the pilot from compliance with any previously issued restriction.

12.2.2.3 At airports without a tower, pilots wishing to make practice instruments approaches should notify the facility having control jurisdiction of the desired approach as indicated on the approach chart. All approach control facilities and Air Route Traffic Control Centers are required to publish a Letter to Airmen depicting those airports where they provide standard separation to both VFR and IFR aircraft conducting practice instrument approaches.

12.2.2.4 The controller will provide approved separation between both VFR and IFR aircraft when authorization is granted to make practice approaches to airports where an approach control facility is located and to certain other airports served by approach control or an Air Route Traffic Control Center. Controller responsibility for separation of VFR aircraft begins at the point where the approach clearance becomes effective or when the aircraft enters Class B or TRSA airspace airspace, whichever comes first.

12.2.2.5 Visual flight rules aircraft practicing instrument approaches are not automatically authorized to execute the missed approach procedure. This authorization must be specifically requested by the pilot and approved by the controller. Separation will not be provided unless the missed approach has been approved by ATC.

12.2.2.6 Except in an emergency, aircraft cleared to practice instrument approaches must not deviate from the approved procedure until cleared to do so by the controller.

12.2.2.7 At radar approach control locations when a full approach procedure (procedure turn, etc.) cannot be approved, pilots should expect to be vectored to a final approach course for a practice instrument approach which is compatible with the general direction of traffic at that airport.

12.2.2.8 When granting approval for a practice instrument approach, the controller will usually ask the pilot to report to the tower prior to or over the final approach fix inbound (nonprecision approaches) or over the outer marker or fix used in lieu of the outer marker inbound (precision approaches).

12.2.2.9 When authorization is granted to conduct practice instrument approaches to an airport with a tower but where approved standard separation is not provided to aircraft conducting practice instrument approaches, the tower will approve the practice approach, instruct the aircraft to maintain VFR and issue traffic information, as required.

12.2.2.10 When an aircraft notifies a flight service station providing Airport Advisory Service of intent to conduct a practice instrument approach and if separation will be provided, you will be instructed to contact the appropriate facility on a specified frequency prior to initiating the approach. At airports where separation is not provided, the flight service station will acknowledge the message and issue known traffic information but will neither approve or disapprove the approach.

12.2.2.11 Pilots conducting practice instrument approaches should be particularly alert for other aircraft operating in the local traffic pattern or in proximity to the airport.

12.2.3 Option Approach

The "Cleared for the Option" procedure will permit an instructor pilot/flight examiner/pilot the option to make a touch-and-go, low approach, missed approach, stop-and-go, or full stop landing. This procedure can be very beneficial in a training situation in that neither the student pilot nor examinee would know what maneuver would be accomplished. The pilot should make his request for this procedure passing the final approach fix inbound on an instrument approach or entering downwind for a VFR traffic pattern. The advantages of this procedure as a training aid are that it enables an instructor/examiner to obtain the reaction of a trainee/examinee under changing conditions, the pilot would not have to discontinue an approach in the middle of the procedure due to student error or pilot proficiency requirements, and finally it allows more flexibility and economy in training programs. This procedure will only be used at those locations with an operational control tower and will be subject to ATC approval/disapproval.

13. SIMULTANEOUS OPERATIONS ON INTERSECTING RUNWAYS

13.1 Despite the many new and lengthened runways which have been added to the Nation's airports in recent years, limited runway availability remains a major contributing factor to operational delays. Many high-density airports have gained operational experience with intersecting runways which clearly indicates that simultaneous operations are safe and feasible. Tower controllers may authorize simultaneous landings or a simultaneous landing and takeoff on intersecting runways when the following conditions are met:

13.1.1 The runways are dry and the controller has received no reports that braking action is less than good.

13.1.2 A simultaneous takeoff and landing operation may be conducted only in VFR conditions.

13.1.3 Instructions are issued to restrict one aircraft form entering the intersecting runway being used by another aircraft.

13.1.4 Traffic information issued is acknowledged by the pilots of both aircraft.

13.1.5 The measured distance from the runway threshold to the intersection is issued if the pilot requests it.

13.1.6 The conditions specified in 13.1.3, 13.1.4 and 13.1.5 are met at or before issuance of the landing clearance.

13.1.7 The distance from the landing threshold to the intersection is adequate for the category of aircraft being held short. Controllers are provided a general table of aircraft category/minimum runway length requirements as a guide. Operators of STOL aircraft should identify their aircraft as such on initial contact with the tower, unless a letter of agreement concerning this fact, is in effect. WHENEVER A HOLD SHORT CLEARANCE IS RECEIVED, IT IS INCUMBENT ON THE PILOT TO DETERMINE HIS/HER ABILITY TO HOLD SHORT OF AN INTERSECTION AFTER LANDING WHEN INSTRUCTED TO DO SO. ADDITIONALLY, PILOTS SHOULD INCLUDE THE WORDS "HOLD SHORT OF (POINT)" IN THE ACKNOWLEDGEMENT OF SUCH CLEARANCES.

13.1.8 There is no tailwind for the landing aircraft restricted to hold short of the intersection.

13.2 The safety and operation of an aircraft remain the responsibility of the pilot. If for any reason; e.g., difficulty in discerning the location of an intersection at night, inability to hold short of an intersection, wind factors, etc., a pilot elects to use the full length of the runway, a different runway, or desires to obtain the distance from the landing threshold to the intersection, he is expected to promptly inform ATC accordingly.

14. EXITING THE RUNWAY AFTER LANDING

The following procedures should be followed after landing and reaching taxi speed.

14.1 Exit the runway without delay at the first available taxiway or on a taxiway as instructed by air traffic control (ATC).

14.2 Taxi clear of the runway unless otherwise directed by ATC. In the absence of ATC instructions the pilot is expected to taxi clear of the landing runway even if that requires the aircraft to protrude into or cross another taxiway, runway, or ramp area. This does not authorize an aircraft to cross a subsequent taxiway/runway/ramp after clearing the landing runway.

Note. — The tower will issue the pilot with instructions which will normally permit the aircraft to enter another taxiway, runway, or ramp area when required to taxi clear of the runway.

14.3 Stop the aircraft after clearing the runway if instructions have not been received from ATC.

14.4 Immediately change to ground control frequency when advised by the tower and obtain a taxi clearance.

Note 1. — The tower will issue instructions required to resolve any potential conflictions with other ground traffic prior to advising the pilot to contact ground control.

Note 2. — A clearance from ATC to taxi to the ramp authorizes the aircraft to cross all runways and taxiway intersections. Pilots not familiar with the taxi route should request specific taxi instructions from ATC.

15. AIRPORT TRAFFIC HAND SIGNALS

See RAC 3.2, Appendix Two.

16. USE OF AIRCRAFT LIGHTS

16.1 Aircraft position and anticollision lights are required to be lighted on aircraft operated from sunset to sunrise. Anticollision lights, however, need not be lighted when the pilot in command determines that, because of operating conditions, it would be in the interest of safety to turn off the lights (FAR 91.209). For example, strobe lights should be turned off on the ground when they adversely affect ground personnel or other pilots and in flight when there are adverse reflections from clouds.

16.2 An aircraft anticollision light system can use one or more rotating beacons and/or strobe lights, be colored either red or white, and have different (higher than minimum) intensities when compared to other aircraft. Many aircraft have both a rotating beacon and a strobe light system.

16.3 The FAA has a voluntary pilot safety program, *Operating Lights On*, to enhance the *see-and-avoid* concept. Pilots are encouraged to turn on their anticollision lights any time the engine/s are running, day or night. Use of these lights is especially encouraged when operating on airport surfaces during periods of reduced visibility and when snow or ice control vehicles are or may be operating. Pilots are also encouraged to turn on their landing lights during takeoff; i.e., either after takeoff clearance has been received or when beginning takeoff roll. Pilots are further encouraged to turn on their landing lights when operating below 10,000 feet, day or night, especially when operating within 10 miles of any airport or in conditions of reduced visibility and in areas where flocks of birds may be expected; i.e., coastal areas, lake areas, around refuse dumps, etc. Although turning on aircraft lights does enhance the *see-and-avoid* concept, pilots should not become complacent about keeping a sharp lookout for other aircraft. Not all aircraft are equipped with lights, and some pilots may not have their lights turned on. Aircraft manufacturers' recommendations for operation of landing lights and electrical systems should be observed.

16.4 Prop and jet blast forces generated by large aircraft have overturned or damaged several smaller aircraft taxiing behind them. To avoid similar results and in the interest of preventing upsets and injuries to ground personnel from such forces, the FAA recommends that air carriers and commercial operators turn on their rotating beacons anytime their aircraft engines are in operation. General aviation pilots using rotating beacon-equipped aircraft are also encouraged to participate in this program which is designed to alert others to the potential hazard. Since this is a voluntary program, exercise caution and do not rely solely on the rotating beacon as an indication that aircraft engines are in operation.

17. FLIGHT INSPECTION/"FLIGHT CHECK" AIRCRAFT IN TERMINAL AREAS.

17.1 "Flight Check" is a call sign used to alert pilots and air traffic controllers when an FAA aircraft is engaged in flight inspection/certification of NAVAID's and flight procedures. Flight Check aircraft fly preplanned high/low altitude flight patterns such as grids, orbits, DME arcs, and tracks, including low passes along the full length of the runway to verify NAVAID performance. In most instances, these flight checks are being automatically recorded and/or flown in an automated mode.

17.2 Pilots should be especially watchful and avoid the flight paths of any aircraft using the call sign "Flight Check" or "Flight Check Recorded." The latter call sign; e.g. "Flight Check 47 Recorded," indicates that automated flight inspections are in progress in terminal areas. These flights will normally receive special handling from ATC. Pilot patience and cooperation in allowing uninterrupted recordings can significantly help expedite flight inspections, minimize costly, repetitive runs, and reduce the burden on the U.S. taxpayer.

ATC CLEARANCE AND SEPARATION—PILOT/CONTROLLER ROLES AND RESPONSIBILITIES

1. CLEARANCE

A clearance issued by ATC is predicated on known traffic and known physical airport conditions. An ATC clearance means an authorization by ATC, for the purpose of preventing collision between known aircraft, for an aircraft to proceed under specified conditions within Class A, B, C, D and E airspace. IT IS NOT AUTHORIZATION FOR A PILOT TO DEVIATE FROM ANY RULE, REGULATION OR MINIMUM ALTITUDE NOR TO CONDUCT UNSAFE OPERATION OF HIS AIRCRAFT.

1.1

FAR 91.3(a) states: "The pilot in command of an aircraft is directly responsible for, and is the final authority as to, the operation of that aircraft." If ATC issues a clearance that would cause a pilot to deviate from a rule or regulation, or in the pilot's opinion, would place the aircraft in jeopardy, IT IS THE PILOT'S RESPONSIBILITY TO REQUEST AN AMENDED CLEARANCE. Similarly, if a pilot prefers to follow a different course of action, such as make a 360 degree turn for spacing to follow traffic when established in a landing or spacing to follow traffic when established in a landing or approach sequence, land on a different runway, takeoff from a different intersection, takeoff from the threshold instead of an intersection or delay his operation, HE IS EXPECTED TO INFORM ATC ACCORDINGLY. When he requests a different course of action, however, the pilot is expected to cooperate so as to preclude the disruption of the traffic flow or the creation of conflicting patterns. The pilot is also expected to use the appropriate aircraft call sign to acknowledge all ATC clearances, frequency changes, or advisory information.

1.2

Each pilot who deviates from an ATC clearance in response to a Traffic Alert and Collision Avoidance System resolution advisory shall notify ATC of that deviation as soon as possible

1.3

When weather conditions permit, during the time an IFR flight is operating, it is the direct responsibility of the pilot to avoid other aircraft since VFR flights may be operating in the same area without the knowledge of ATC, and traffic clearances provide standard separation only between IFR flights.

1.4 Clearance Items

An ATC clearance normally contains the following:

1.4.1 Clearance Limit

The traffic clearance issued prior to departure will normally authorize flight to the airport of intended landing. Under certain conditions at some locations, a short-range clearance procedure is utilized whereby a clearance is issued to a fix within or just outside the terminal area and the pilot is advised of the frequency on which he will receive the long-range clearance direct from the center controller.

1.4.2 Departure Procedure

Headings to fly and altitude restrictions may be issued to separate a departure from other air traffic in the terminal area. Where the volume of traffic warrants Standard Instrument Departures (SID's) have been developed. (See RAC 4.)

1.4.3 Route of Flight

1.4.3.1 Clearances are normally issued for the altitude/flight level and route filed by the pilot. However, due to traffic conditions, it is frequently necessary for ATC to specify an altitude/flight level or route different from that requested by the pilot. In addition, flow patterns have been established in certain congested areas, or between congested areas, whereby traffic capacity is increased by routing all traffic on preferred routes. Information on these flow patterns is available in offices where preflight briefing is furnished or where flight plans are accepted.

1.4.3.2 When required air traffic clearances include data to assist pilots in identifying radio reporting points. It is responsibility of a pilot to notify ATC immediately if his radio equipment cannot receive the type of signals he must utilize to comply with his clearance.

1.4.4 Altitude Data

1.4.4.1 The altitude/flight level instructions in an ATC clearance normally require that a pilot "MAINTAIN" the altitude/flight level to which the flight will operate when in Class A, B, C, D and E airspace. Altitude/flight level changes while en route should be requested prior to the time the change is desired.

1.4.4.2 When possible, if the altitude assigned is different than that requested by the pilot, ATC will inform an aircraft when to expect climb or descent clearance or to request altitude change from another facility. If this has not been received prior to crossing the boundary of the ATC facility's area and assignment at a different flight level is still desired, the pilot should reinitiate his request with the next facility.

1.4.4.3 The term "CRUISE" may be used instead of "MAINTAIN" to assign a block of airspace, to a pilot, from the minimum IFR altitude up to and including the altitude specified in the cruise clearance. The pilot may level off at any intermediate altitude within this block of airspace. Climb/descent within the block is to be made at the discretion of the pilot. However, once the pilot starts descent and verbally reports leaving an altitude in the block, he may not return to that altitude without additional ATC clearance.

1.4.5 Holding Instructions

1.4.5.1 Whenever an aircraft is cleared to a fix other than the destination airport and delay is expected, it is the responsibility of the ATC controller to issue complete holding instructions (unless the pattern is charted), an EFC time, and his best estimate of any additional en route/terminal delay.

1.4.5.2 If the holding pattern is charted and the controller doesn't issue complete holding instructions, the pilot is expected to hold as depicted on the appropriate chart. When the pattern is charted, the controller may omit all holding instructions except the charted holding direction and the statement "AS PUBLISHED;" e.g., "HOLD EAST AS PUBLISHED." Controllers shall always issue complete holding instructions when pilots request them.

Note. — Only those holding patterns depicted on U.S. Government or commercially produced (meeting FAA requirements) low/high altitude enroute, and area or STAR charts should be used.

1.4.5.3 If no holding pattern is charted and holding instructions have not been issued, the pilot should ask ATC for holding instructions prior to reaching the fix. This procedure will eliminate the possibility of an aircraft entering a holding pattern other than that desired by ATC. If the pilot is unable to obtain holding instructions prior to reaching the fix (due to frequency congestion, stuck microphones, etc.), he should hold in a standard pattern on the course on which he approached the fix and request further clearance as soon as possible. In this event, the altitude/flight level of the aircraft at the clearance limit will be protected so that separation will be provided as required.

1.4.5.4 When an aircraft is 3 minutes or less from a clearance limit and a clearance beyond the fix has not been received, the pilot is expected to start a speed reduction so that he will cross the fix, initially, at or below the maximum holding airspeed.

1.4.5.5 When no delay is expected, the controller should issue a clearance beyond the fix as soon as possible and, whenever possible, at least 5 minutes before the aircraft reaches the clearance limit.

1.4.5.6 Pilots should report to ATC the time and altitude/flight level at which the aircraft reaches the clearance limit and report leaving the clearance limit.

Note. — In the event of two-way communications failure, pilots are required to comply with FAR 91.185.

1.5 Amended Clearance

1.5.1 Amendments to the initial clearance will be issued at any time an air traffic controller deems such action necessary to avoid possible confliction between aircraft. Clearances will require that a flight "hold" or change altitude prior to reaching the point where standard separation from other IFR traffic would no longer exist. Some pilots have questioned this action and requested "traffic information" and were at a loss when the reply indicated "no traffic reported." In such cases the controller has taken action to prevent a traffic confliction which would have occurred at a distant point.

1.5.2 A pilot may wish an explanation of the handling of his flight at the time of occurrence; however, controllers are not able to take time from their immediate control duties nor can they afford to overload the ATC communications channels to furnish explanations. Pilots may obtain an explanation by directing a letter or telephone call to the chief controller of the facility involved.

1.5.3 The pilot has the privilege of requesting a different clearance from that which has been issued by ATC if he feels that he has information which would make another course of action more practicable or if aircraft equipment limitations or company procedures forbid compliance with the clearance issued.

1.5.4 Pilots should pay particular attention to the clearance and not assume that the route and altitude/flight level are the same as requested in the flight plan. It is suggested that pilots make a written report of clearances at the time they are received, and verify, by a repeat back, any portions that are complex or about which a doubt exists. It will be the responsibility of each pilot to accept or refuse the clearance issued.

1.6 Special VFR Clearance

1.6.1 An ATC clearance must be obtained *prior* to operating within Class B, C, D and E surface areas when the weather is less than that required for VFR flight. A VFR pilot may request and be given a clearance to enter, leave or operate within most Class D and E surface areas and some Class B and C surface areas in special VFR conditions, traffic permitting, and providing such flight will not delay IFR operations. All special VFR flights must remain clear of clouds. The visibility requirements for Special VFR aircraft (other than helicopters) are:

1.6.1.1 At least one statute mile flight visibility for operations within Class B, C, D and E surface areas.

1.6.1.2 At least one statute mile ground visibility if taking off or landing. If ground visibility is not reported at that airport, the flight visibility must be at least one statute mile.

1.6.1.3 The restriction in (1) and (2) do not apply to helicopters. Helicopters must remain clear of clouds and may operate in Class B, C, D and E surface areas with less than one statute mile visibility.

1.6.2 When a control tower is located within Class B, C and D surface areas, requests for clearances should be to the tower. If no tower is located within the surface area, a clearance may be obtained from the nearest tower, flight service station or center.

1.6.3 It is not necessary to file a complete flight plan with the request for clearance but the pilot should state his intentions in sufficient detail to permit air traffic control to fit his flight into the traffic flow. The clearance will not contain a specific altitude as the pilot must remain clear of clouds. The controller may require the pilot to fly at or below a certain altitude due to other traffic, but the altitude specified will permit flight at or above the minimum safe altitude. In addition, at radar locations, flight may be vectored if necessary for control purposes or on pilot request.

Note. — The pilot is responsible for obstacle or terrain clearance (reference FAR 91.119).

1.6.4 Special VFR clearances are effective within Class B, C, D and E surface areas only. ATC does not provide separation after an aircraft leaves Class D surface area on a special VFR clearance.

1.6.5 Special VFR operations by fixed-wing aircraft are prohibited in some Class B and C surface areas due to the volume of IFR traffic. A list of these Class B and C surface areas is contained in FAR 93.113, and also depicted on Sectional Aeronautical Charts.

1.6.6 ATC provides separation between special VFR flights and between them and other IFR flights.

1.6.7 Special VFR operations by fixed-wing aircraft are prohibited between sunset and sunrise unless the pilot is instrument rated and the aircraft is equipped for IFR flight.

1.7 Clearance Prefix

A clearance, information, or request for information originated by an ATC facility and relayed to the pilot through an air/ground communication station will be prefixed by "ATC CLEARS," "ATC ADVISES," or "ATC REQUESTS."

1.8 VFR/IFR Flights

1.8.1 A pilot departing VFR, either intending to or needing to obtain an IFR clearance en route, must be aware of the position of the aircraft and the relative terrain/obstructions. When accepting a clearance below the MEA/MIA/MVA, pilots are responsible for their own terrain/obstruction clearance until reaching the MEA/MIA/MVA. If the pilot is unable to maintain terrain/obstruction clearance the controller will advise the pilot to state intentions.

2. PILOT RESPONSIBILITIES UPON CLEARANCE ISSUANCE

2.1 RECORD ATC CLEARANCE—When conducting an IFR operation, make a written record of your ATC clearance. The specified conditions which are a part of your air traffic clearance may be somewhat different from those included in your flight plan. Additionally, ATC may find it necessary to ADD conditions, such as a particular departure route. The very fact that Air Traffic Control specifies different or additional conditions means that other aircraft are involved in the traffic situation.

2.2 ATC CLEARANCE/INSTRUCTION READBACK—Pilots of airborne aircraft should read back those parts of the ATC clearances/instructions containing altitude assignments or vectors, as a means of mutual verification. The readback of the "numbers" serves as a double check between pilots and controllers, and such, it is an invaluable aid in reducing the kinds of communications errors that occur when a number is either "misheard" or is incorrect.

2.2.1 Precede all readbacks/acknowledgments with the aircraft identification. This is the only way that controllers can determine that the correct aircraft received the clearance/instruction. The requirement to include aircraft identification in all readbacks/acknowledgments becomes more important as frequency congestion increases and when aircraft with similar call signs are on the same frequency.

2.2.2 Read back altitudes, altitude restrictions, and vectors in the same sequence as they are given in the clearance/instruction.

2.2.3 Altitudes contained in charted procedures such as SID's, instrument approaches, etc., should not be read back unless they are specifically stated by the controller.

2.3 It is the responsibility of the pilot to accept or refuse the clearance issued.

3. PILOT RESPONSIBILITIES UPON CLEARANCE EXECUTION—ADHERENCE TO CLEARANCE

3.1 When air traffic clearance has been obtained under either the Visual or Instrument Flight Rules, the pilot in command of the aircraft shall not deviate from the provisions thereof unless an amended clearance is obtained. When ATC issues a clearance or instruction pilots are expected to execute its provisions upon receipt. ATC, in certain situations, will include the word "IMMEDIATELY" in a clearance or instruction to impress urgency of an imminent situation and expeditious compliance by the pilot is expected and necessary for safety. The addition of a VFR or other restriction; i.e., climb/descent point or time, crossing altitude, etc., does not authorize a pilot to deviate from the route of flight or any other provision of the ATC clearance.

3.2 When a heading is assigned or a turn is requested by ATC, pilots are expected to promptly initiate the turn, to complete the turn, and maintain the new heading unless issued additional instructions.

3.3 The term "at pilots discretion" included in the altitude information of an ATC clearance means that ATC has offered the pilot the option to start climb or descent when he wishes. He is authorized to conduct the climb or descent at any rate he wishes and to temporarily level off at any intermediate altitude he may desire. However, once he has vacated an altitude, he may not return to that altitude.

3.4 When ATC has not used the term "AT PILOT'S DISCRETION" nor imposed any climb/descent restrictions, pilots should initiate climb or descent promptly on acknowledgement of the clearance. Descend or climb at an optimum rate consistent with the operating characteristics of the aircraft to 1,000 feet above or below the assigned altitude, and then attempt to descend or climb at a rate of between 500 and 1,500 feet per minute until the assigned altitude is reached. If at any time the pilot is unable to climb/descend at a rat of at least 500 feet a minute, advise ATC. If it is necessary to level off at an intermediate altitude, during climb or descent, advise ATC, except for level off at 10,000 feet MSL on descent or 3,000 feet above airport elevation (prior to entering a Class B, C or D surface area), when required for speed reduction (FAR 91.117).

Note. — Leveling off at 10,000 feet MSL on descent, or 3,000 feet above airport elevation (prior to entering in a Class B, C or D surface area), to comply with FAR 91.117 airspeed restrictions, is commonplace. Controllers anticipate this action and plan accordingly. Leveling off at any other time, on climb or descent, may seriously affect air traffic handling by ATC. Consequently, it is imperative that pilots make every effort to fulfill the above expected actions to aid ATC in safely handling and expediting traffic.

3.5 If the altitude information of an ATC DESCENT clearance includes a provision to "CROSS (fix) AT/AT OR ABOVE/BELOW (altitude)," the manner in which the descent is executed to comply with the crossing altitude is at the pilot's discretion. This authorization to descend at pilot's discretion is only applicable to that portion of the flight to which the crossing altitude restriction applies, and the pilot is expected to comply with the crossing altitude as a provision of the clearance. Any other clearance in which pilot execution is optional will so state: "AT PILOT'S DISCRETION."

Examples:

"UNITED FOUR SEVENTEEN, DESCEND AND MAINTAIN SIX THOUSAND."

Note. — The pilot is expected to commence descent upon receipt of the clearance and to descend at the suggested rates specified above until reaching the assigned altitude of 6,000 feet.

"UNITED FOUR SEVENTEEN, DESCEND AT PILOT'S DISCRETION, MAINTAIN SIX THOUSAND."

Note. — The pilot is authorized to conduct descent within the context of the term AT PILOT'S DISCRETION as described above.

"UNITED FOUR SEVENTEEN, CROSS LAKEVIEW V-O-R AT OR ABOVE FLIGHT LEVEL TWO ZERO ZERO, DESCEND AND MAINTAIN SIX THOUSAND."

Note. — The pilot is authorized to conduct descent AT PILOT'S DISCRETION until reaching Lakeview VOR. He must comply with the clearance provision to cross the Lakeview VOR at or above FL 200. After passing Lakeview VOR, he is expected to descend at the rates specified above until reaching the assigned altitude of 6,000 feet.

"UNITED FOUR SEVENTEEN, CROSS LAKEVIEW V-O-R AT SIX THOUSAND, MAINTAIN SIX THOUSAND."

Note. — The pilot is authorized to conduct descent AT PILOT'S DISCRETION; however, he must comply with the clearance provision to cross the Lakeview VOR at 6,000 feet.

"UNITED FOUR SEVENTEEN, DESCEND NOW TO FLIGHT LEVEL TWO SEVEN ZERO, CROSS LAKEVIEW V-O-R AT OR BELOW ONE ZERO THOUSAND, DESCEND AND MAINTAIN SIX THOUSAND."

Note. — The pilot is expected to promptly execute and complete descent to FL 270 upon receipt of the clearance. After reaching FL 270, he is authorized to descend "at pilot's discretion" until reaching Lakeview VOR. He must comply with the clearance provision to cross Lakeview VOR at or below 10,000 feet. After Lakeview VOR, he is expected to descend at the rates specified above until reaching 6,000 feet.

"UNITED THREE TEN, DESCEND NOW AND MAINTAIN FLIGHT LEVEL TWO FOUR ZERO, PILOT'S DISCRETION AFTER REACHING FLIGHT LEVEL TWO EIGHT ZERO."

Note. — The pilot is expected to commence descent upon receipt of the clearance and to descend at the suggested rates until reaching flight level 280. At that point, the pilot is authorized to continue descent to flight level 240 within the context of the term "AT PILOTS'S DISCRETION" as described above.

3.6 In case emergency authorization is used to deviate from the provisions of an ATC clearance, the pilot in command shall notify ATC as soon as possible and obtain an amended clearance. In an emergency situation which results in no deviation from the rules prescribed in Part 91 but which requires air traffic control to give priority to an aircraft, the pilot of such aircraft shall when requested by ATC make a report within 48 hours of such emergency situation to the chief of the ATC facility.

3.7 The guiding principle is that the last ATC clearance has precedence over the previous ATC clearance. When the route or altitude in a previously issued clearance is amended, the controller will restate applicable altitude restrictions. If altitude to maintain is changed or restated, whether prior to departure or while airborne, and previously issued altitude restrictions are omitted, including SID altitude restrictions, then those altitude restrictions are canceled.

Examples:

A departure flight receives a clearance to the destination airport to maintain Flight Level 290. The clearance incorporates a SID which has certain altitude crossing restrictions. Shortly after takeoff, the flight receives a new clearance changing the maintaining Flight Level from 290 to 250. If the altitude restrictions are still applicable, the controller restates them.

A departing aircraft is cleared to cross Fluky intersection at or above 3,000, Gordonsville VOR at or above 12,000, maintain FL 200. Shortly after departure, the altitude to be maintained is changed to FL 240. If the altitude restrictions are still applicable the controller issues an amended clearance as follows, "CROSS FLUKY INTERSECTION AT OR ABOVE THREE THOUSAND, CROSS GORDONSVILLE V-O-R AT OR ABOVE ONE TWO THOUSAND, MAINTAIN FLIGHT LEVEL TWO FOUR ZERO."

An arriving aircraft is cleared to the destination airport via V45 Delta VOR direct, cross Delta at 10,000, maintain 6,000. Prior to Delta VOR, the controller issues an amended clearance as follows, "TURN RIGHT HEADING ONE EIGHT ZERO FOR VECTORS TO RUNWAY THREE SIX I-L-S APPROACH, MAINTAIN SIX THOUSAND." Because the altitude restriction "cross Delta VOR at 10,000" was omitted from the amended clearance, it is no longer in effect.

3.8 Pilots of turbojet aircraft equipped with afterburner engines should advise ATC prior to takeoff if they intend to use afterburning during their climb to the en route altitude. Often, the controller may be able to plan his traffic to accommodate a high performance climb and allow the

4. IFR CLEARANCE VFR-ON-TOP

4.1 A pilot on an IFR flight plan operating in VFR weather conditions, may request VFR ON TOP in lieu of an assigned altitude. This would permit the pilot to select an altitude or flight level of his choice (Subject to any ATC restrictions).

4.2 Pilots desiring to climb through a cloud, haze, smoke, or other meteorological formation and then either cancel their IFR flight plan or operate VFR ON TOP may request a climb to VFR ON TOP. The ATC authorization shall contain either a top report or a statement that no top report is available, and a request to report reaching VFR ON TOP. Additionally, the ATC authorization limit, routing and an alternative clearance if VFR ON TOP is not reached by a specified altitude.

4.3 A pilot on an IFR flight plan operating in VFR conditions may request to climb/descend in VFR conditions.

4.4 ATC may not authorize VFR ON TOP/VFR CONDITIONS operations unless the pilot requests the VFR operation or a clearance to operate in VFR CONDITIONS will result in noise abatement benefits where part of the IFR departure route does not conform to an FAA approved noise abatement route or altitude.

4.5 When operating in VFR conditions with an ATC authorization to "MAINTAIN VFR ON TOP/MAINTAIN VFR CONDITIONS," pilots on IFR flight plans must:

4.5.1 Fly at the appropriate VFR altitude as prescribed in FAR 91.159.

4.5.2 Comply with the VFR visibility and distance from cloud criteria in FAR 91.155 (BASIC VFR WEATHER MINIMUMS).

4.5.3 Comply with instrument flight rules that are applicable to his flight; i.e., minimum IFR altitude, position reporting, radio communications, course to be flown, adherence to ATC clearance, etc. Pilots should advise ATC prior to any altitude change to insure the exchange of accurate traffic information.

4.6 ATC authorization to "MAINTAIN VFR ON TOP" is not intended to restrict pilots so that they must operate only above an obscuring meteorological formation (layer). Instead, it permits operation above, below, between layers or in areas where there is no meteorological obscuration. It is imperative that clearance to operate "VFR ON TOP/VFR CONDITIONS" does not imply cancellation of the IFR.

4.7 Pilots operating VFR ON TOP/VFR CONDITIONS, may receive traffic information from ATC, on other pertinent IFR or VFR aircraft. However, aircraft operating in Class B or Class C airspace and TRSAs shall be separated as required by FAA Order 7110.65. When operating in VFR weather conditions, it is the pilot's responsibility to be vigilant so as to see and avoid other aircraft.

4.8 ATC will not authorize VFR or VFR ON TOP operations in Class A Airspace. (See RAC 3.4, Class A Airspace).

5. SEPARATION STANDARDS

5.1 Runway Separation

Tower controllers establish the sequence of arriving and departing aircraft by requiring them to adjust flight or ground operation as necessary to achieve proper spacing. They may "HOLD" an aircraft short of the runway to achieve spacing between it and another arriving aircraft; the controller may instruct a pilot to "EXTEND DOWN-WIND" in order to establish spacing from another arriving or departing aircraft. At times a clearance may include the word "IMMEDIATE." For example: "CLEARED FOR IMMEDIATE TAKEOFF." In such cases "IMMEDIATE" is used for purposes of *air traffic separation.* It is up to the pilot to refuse the clearance if, in his opinion, compliance would adversely affect his operation.

5.2 Visual Separation

5.2.1 Visual separation is a means employed by ATC to separate IFR aircraft only in terminal areas. There are two methods employed to effect this separation:

5.2.1.1 The tower controller sees the aircraft involved and issues instructions, as necessary, to ensure that the aircraft avoid each other.

5.2.1.2 A pilot sees the other aircraft involved and upon instructions from the controller provides his own separation by maneuvering his aircraft as necessary to avoid it. This may involve following in-trail behind another aircraft or keeping it in sight until it is no longer a factor.

5.2.2 A pilot's acceptance of instructions to follow another aircraft or provide visual separation from it is an acknowledgment that the pilot will maneuver his/her aircraft as necessary to avoid the other aircraft or to maintain in-trail separation. In operations conducted behind heavy jet aircraft, it is also an acknowledgment that the pilot accepts the responsibility for wake turbulence separation.

5.2.3 When a pilot has been told to follow another aircraft or to provide visual separation from it, he/she should promptly notify the controller is visual contact with the other aircraft is lost or cannot be maintained or if the pilot cannot accept the responsibility for the separation for any reason.

5.2.4 Pilots should remember, however, that they have a regulatory responsibility (FAR 91.113) to see and avoid other aircraft when weather conditions permit.

5.2.5 Pilot Visual Clearing Procedures

5.2.5.1 Before Takeoff. Prior to taxiing onto a runway or landing area in preparation for takeoff, pilots should scan the approach areas for possible landing traffic, executing appropriate clearing maneuvers to provide him a clear view of the approach areas.

5.2.5.2 Climbs and Descents. During climbs and descents in flight conditions which permit visual detection of other traffic, pilots should execute gentle banks, left and right at a frequency which permits continuous visual scanning of the airspace about them.

5.2.5.3 Straight and Level. Sustained periods of straight and level flight in conditions which permit visual detection of other traffic should be broken at intervals with appropriate clearing procedures to provide effect visual scanning.

5.2.5.4 Traffic patterns. Entries into traffic patterns while descending create specific collision hazards and should be avoided.

5.2.5.5 Traffic at VOR sites. All operators should emphasize the need for sustained vigilance in the vicinity of VOR's and airway intersections due to the convergency of traffic.

5.2.5.6 Training operations. Operators of pilot training programs are urged to adopt the following practices:

5.2.5.6.1 Pilots undergoing flight instruction at all levels should be requested to verbalize clearing procedures (call out, "Clear" left, right, above, or below) to instill and sustain the habit if vigilance during maneuvering.

5.2.5.6.2 High-wing airplane—momentarily raise the wing in the direction of the intended turn and look.

5.2.5.6.3 Low-wing airplane—momentarily lower the wing in the direction of the intended turn and look.

5.2.5.6.4 Appropriate clearing procedures should precede the execution of all turns including chandelles, lazy eights, stalls, slow flight, climbs, straight and level, spins, and other combination maneuvers.

5.3 IFR Separation Standards

5.3.1 ATC effects separation of aircraft vertically by assigning different altitudes; longitudinally by providing an interval expressed in time or distance between aircraft on the same, converging, or crossing courses; and laterally by assigning different flight paths.

5.3.2 Separation will be provided between all aircraft operating on IFR flight plans except during that part of the flight (outside a Class B, Class C airspace or a TRSA) being conducted on a VFR CONDITIONS ON TOP/VFR CONDITIONS clearance. under these conditions, ATC may issue traffic advisories but it is the sole responsibility of the pilot to be vigilant so as to see and avoid other aircraft.

5.3.3 When radar is employed in the separation of aircraft at the same altitude, a minimum of 3 miles separation is provided between aircraft operating within 40 miles of the radar antenna site, and 5 miles between aircraft operating beyond 40 miles from the antenna site. These minimums may be increased or decreased in certain specific situations.

Note. — Certain separation standards are increased in the terminal environment when Center Radar ARTS Presentation/Processing (CENRAP) is being utilized.

5.4 Speed Adjustments

5.4.1 ATC will issue speed adjustments to pilots of radar controlled aircraft to achieve or maintain required or desired spacing.

5.4.2 ATC will express all speed adjustments in terms of knots based on indicated airspeed (IAS) in 10 knot increments except that at or above FL 240 speeds may be expressed in terms of Mach numbers in .01 increments. The use of Mach numbers is restricted turbojet aircraft with Mach meters.

5.4.3 Pilots of aircraft in U.S. domestic Class A, B, C, D and E airspace complying with speed adjustments should maintain a speed of ±10 knots or 0.02 Mach number, whichever is less, of the assigned speed.

5.4.3.1 Pilots of aircraft in offshore Controlled Airspace or oceanic Controlled Airspace shall adhere to the ATC assigned airspeed and shall request ATC approval before making any change thereto. If it is essential to make an immediate temporary change in the Mach number (e.g., due to turbulence), ATC shall be notified as soon as possible. If it is not feasible to maintain the last assigned Mach number during an en route climb or descent due to aircraft performance, advise ATC at the time of the request.

5.4.4 Unless pilot concurrence is obtained, ATC requests for speed adjustments will be in accordance with the following minimums:

5.4.4.1 To aircraft operating between FL 280 and 10,000 feet, a speed not less than 250 knots or the equivalent Mach number.

5.4.4.2 To turbine powered aircraft operating below 10,000 feet, a speed not less than 210 knots, except within 20 flying miles of the runway threshold of the airport of intended landing, a speed not less than 170 knots.

5.4.4.3 Reciprocating engine or turboprop aircraft within 20 flying miles of the runway threshold of the airport of intended landing, a speed not less than 150 knots.

5.4.4.4 Departures, for turbine powered aircraft, a speed not less than 230 knots; for reciprocating engine aircraft, a speed not less than 150 knots.

5.4.5 When ATC combines a speed adjustment with a descent clearance, the sequence of delivery with the word "then" between, indicates the expected order of execution; i.e., "DESCEND AND MAINTAIN (altitude); THEN, REDUCE SPEED TO (speed)," or "REDUCE SPEED TO (speed); THEN, DESCEND AND MAINTAIN (altitude)." However, the maximum speeds below 10,000 feet as established in FAR 91.117 still apply. If there is any doubt concerning the manner in which such a clearance is to be executed, request clarification from ATC.

5.4.6 If ATC determines (before an approach clearance is issued) that it is no longer necessary to apply speed adjustment procedures, they will inform the pilot to resume normal speed. Approach clearances supersede any prior speed adjustment assignments, and pilots are expected to make their own speed adjustments, as necessary, to complete the approach. Under certain circumstances however, it may be necessary for ATC to issue further speed adjustments after approach clearance is issued to maintain separation between successive arrivals. Under such circumstances, previously issued speed adjustments will be restated if that speed is to be maintained or additional speed adjustments are requested. ATC must obtain pilot concurrence for speed adjustments after approach clearances are issued. Speed adjustments should not be assigned inside the final approach fix on final or a point 5 miles from the runway, whichever is closer to the runway.

5.4.7 The pilots retain the prerogative of rejecting the application of speed adjustment by ATC if the minimum safe airspeed for any particular operation is greater than the speed adjustment. IN SUCH CASES, PILOTS ARE EXPECTED TO ADVISE ATC OF THE SPEED THAT WILL BE USED.

5.4.8 Pilots are reminded that they are responsible for rejecting the application of speed adjustment by ATC if, in their opinion, it will cause them to exceed the maximum indicated airspeed prescribed by FAR 91.117. IN SUCH CASES, THE PILOT IS EXPECTED TO SO INFORM ATC. Pilots operating at or above 10,000 feet MSL who are issued speed adjustments which exceed 250 knots IAS and are subsequently cleared below 10,000 feet MSL are expected to comply with FAR 91.117(a).

5.4.9 For operations conducted below 10,000 feet MSL when outside the United States and beneath Class B airspace, airspeed restrictions apply to all U.S. registered aircraft. For operations conducted below 10,000 feet MSL when outside the United States within Class B Airspace, there are no speed restrictions.

5.4.10 For operations in a Class B, C or D surface area, ATC is authorized to request or approve a speed greater than the maximum indicated airspeeds prescribed for operation within that airspace. (Reference FAR 91.117(b).)

5.4.11 When in communication with the ARTCC, pilots should, as a good operating practice, any ATC assigned speed restriction on initial radio contact associated with an ATC communications frequency change.

6. PILOT/CONTROLLER ROLES/RESPONSIBILITIES

6.1 General

6.1.1 The roles and responsibilities of the pilot and controller for effective participation in the ATC system are contained in several documents. Pilot responsibilities are in the Federal Aviation Regulations (FAR's) and the air traffic controller's are in the Air Traffic Control Handbook (7110.65) and supplemental FAA directives. Additional and supplemental information for pilots can be found in the current Airman's Information Manual, Notices to Airmen, advisory circulars, and aeronautical charts. Since there are many other excellent publications produced by nongovernment organizations as well as other Government organizations with various updating cycles, questions concerning the latest or most current material can be resolved by cross-checking with the above mentioned documents.

6.1.2 The pilot in command of an aircraft is directly responsible for and is the final authority as to the safe operation of that aircraft. In an emergency requiring immediate action, the pilot in command may deviate from any rule in the General, Subpart A, and Flight Rules, Subpart B, in accordance with FAR 91.3

6.1.3 The air traffic controller is responsible to give first priority to the separation of aircraft and to the issuance of radar safety alerts second priority to other services that are required, but do not involve separation of aircraft and third priority to additional services to the extent possible.

6.1.4 In order to maintain a safe and efficient air traffic system, it is necessary that each party fulfill his responsibilities to the fullest.

6.1.5 The responsibilities of the pilot and the controller intentionally overlap in many areas providing a degree of redundancy. Should one or the other fail in any manner, this over lapping responsibility is expected to compensate, in many cases, for failures that may affect safety.

6.1.6 The following, while not intended to be all inclusive, is a brief listing of pilot and controller responsibilities for some commonly used procedures or phases of flight. More detailed explanations are contained in the appropriate Federal Aviation Regulations, Advisory Circulars and similar publications. The information provided here is an overview of the principles involved and is not meant as an interpretation of the rules nor is it intended to extend or diminish responsibilities.

6.2 Air Traffic Clearance

6.2.1 Pilot

6.2.1.1 Acknowledges receipt and understanding of an ATC clearance.

6.2.1.2 Readbacks any hold short of runway instructions issued by ATC.

6.2.1.3 Request clarification or amendment, as appropriate, any time a clearance is not fully understood, or considered unacceptable from a safety standpoint.

6.2.1.4 Promptly complies with an air traffic clearance upon receipt except as necessary to cope with an emergency. Advises ATC as soon as possible and obtains an amended clearance if deviation is necessary,

Note. — A clearance to land means that appropriate separation on the landing runway will be ensured. A landing clearance does not relieve the pilot from compliance with any previously issued altitude crossing restriction.

6.2.2 Controller

6.2.2.1 Issues appropriate clearances for the operation being or to be conducted in accordance with established criteria.

6.2.2.2 Assigns altitudes in IFR clearances that are at or above the minimum IFR altitudes in Class A, B, C, D and E airspace.

6.2.2.3 Ensures acknowledgements by the pilot for issued information, clearance or instructions.

6.2.2.4 Ensures that readbacks by the pilot of altitude, heading, or other items are correct. If incorrect, distorted, or incomplete, makes corrections as appropriate.

6.3 Contact Approach

6.3.1 Pilot

6.3.1.1 This approach must be requested by the pilot and is made in lieu of a standard or special instrument approach.

6.3.1.2 By requesting the contact approach, the pilot indicates that the flight is operating clear of clouds, has at least 1 mile flight visibility, and can reasonably expect to continue to the destination airport in those conditions.

6.3.1.3 Be aware that while conducting a contact approach, the pilot assumes responsibility for obstruction clearance.

6.3.1.4 Advise ATC immediately if you are unable to continue the contact approach or if you encounter less than 1 mile flight visibility.

6.3.1.5 Be aware that, if radar service is being received, it may automatically terminate when the pilot is told to contact the tower. (See RADAR SERVICE TERMINATED in the *Pilot/ Controller Glossary.)*

6.3.2 Controller

6.3.2.1 Issues clearance for contact approach only when requested by the pilot. Does not solicit the use of this procedure.

6.3.2.2 Before issuing clearance, ascertains that reported ground visibility at destination airport is at least 1 mile.

6.3.2.3 Provides approved separation between aircraft cleared for contact approach and other IFR or special VFR aircraft. When using vertical separation, does not assign a fixed altitude but clears the aircraft at or below an altitude which is at least 1,000 feet below any IFR traffic but not below minimum safe altitudes prescribed in FAR 91.119.

6.3.2.4 Issues alternative instructions if, in his judgment, weather conditions may make completion of the approach impracticable.

6.4 Instrument Approach

6.4.1 Pilot

6.4.1.1 Be aware that the controller issues clearance for approach based only on known traffic.

6.4.1.2 Follow the procedures as shown on the instrument approach chart including all restrictive notations, such as:

6.4.1.2.1 Procedure not authorized at night;

6.4.1.2.2 Approach not authorized when local area altimeter not available;

6.4.1.2.3 Procedure not authorized when control tower not in operation;

6.4.1.2.4 Procedure not authorized when glide slope not used;

6.4.1.2.5 Straight-in minimums not authorized at night, etc.;

6.4.1.2.6 Radar required; or

6.4.1.2.7 The circling minimums published on the instrument approach chart provide adequate obstruction clearance and the pilot should not descend below the circling altitude until the aircraft is in a position to make final descent for landing. Sound judgment and knowledge of his and the aircraft's capabilities are the criteria for a pilot to determine the exact maneuver in each instance since airport design and the aircraft position, altitude, and airspeed must all be considered. (See RAC 4, Paragraph 3.9.13, Circling Minimums.)

6.4.1.3 Upon receipt of an approach clearance while on an unpublished route or being radar vectored:

6.4.1.3.1 Comply with the minimum altitude for IFR and;

6.4.1.3.2 Maintain last assigned altitude until established on a segment of a published route or Instrument Approach Procedure (IAP), at which time published altitudes apply.

6.4.2 Controller

6.4.2.1 Issues an approach clearance based on known traffic.

6.4.2.2 Issues an IFR approach clearance only after aircraft is established on a segment of published route or IAP, or assigns an appropriate altitude for the aircraft to maintain until so established.

6.5 Missed Approach

6.5.1 Pilot

6.5.1.1 Execute a missed approach when one of the following conditions exist:

6.5.1.1.1 Arrival at the missed approach point (MAP) or the decision height (DH) and visual reference to the runway environment is insufficient to complete the landing.

6.5.1.1.2 Determine that a safe landing is not possible.

6.5.1.1.3 Instructed to do so by ATC.

6.5.1.2 Advise ATC that a missed approach will be made. Include the reason for the missed approach unless initiated by ATC.

6.5.1.3 Comply with the missed approach instructions for the instrument approach procedure being executed unless other missed approach instructions are specified by ATC.

6.5.1.4 If executing a missed approach prior to reaching the MAP or DH, advise ATC and fly the instrument procedure to the MAP at an altitude at or above the MDA or DH before executing a turning maneuver.

6.5.1.5 Radar vectors issued by ATC when informed that a missed approach is being executed supersedes the previous missed approach procedure.

6.5.1.6 If making a missed approach from a radar approach, execute the missed approach procedure previously given or climb to the altitude and fly the heading specified by the controller.

6.5.1.7 Following a missed approach, request clearance for specific action; i.e., another approach, hold for improved conditions, proceed to an alternate airport, etc.

6.5.2 Controller

6.5.2.1 Issues an approved alternate missed approach procedure if it is desired that the pilot execute a procedure other than as depicted on the instrument approach chart.

6.5.2.2 May vector a radar identified aircraft executing a missed approach when operationally advantageous to the pilot or the controller.

6.5.2.3 In response to the pilot's stated intentions, issues a clearance to an alternate airport, to a holding fix, or for reentry into the approach sequence, as traffic conditions permit.

6.6 Radar Vectors

6.6.1 Pilot

6.6.1.1 Promptly comply with headings and altitudes assigned to you by the controller

6.6.1.2 Question any assigned heading or altitude believed to be incorrect.

6.6.1.3 If operating VFR and compliance with any radar vector or altitude would cause a violation of any FAR, advise ATC and obtain a revised clearance or instruction.

6.6.2 Controller

6.6.2.1 Vectors aircraft in Class A, B, C, D and E airspace:

6.6.2.1.1 For separation.

6.6.2.1.2 For noise abatement.

6.6.2.1.3 To obtain an operational advantage for the pilot or the controller.

6.6.2.2 Vectors aircraft in Class A, B, C, D, E and G airspace when requested by the pilot.

6.6.2.3 Vectors IFR aircraft at or above minimum vectoring altitudes.

6.6.2.4 May vector VFR aircraft, not at an ATC assigned altitude, at any altitude. In these cases, terrain separation is the pilot's responsibility.

6.7 Speed Adjustments

6.7.1 Pilot (In U.S. Domestic Class A, B, C, D and E airspace)

6.7.1.1 Except as stated in paragraphs 6.7.3 and 6.7.4, advise ATC anytime the true airspeed at cruising level varies or is expected to vary by ±10 knots or 0.02 Mach number, whichever is less, of the filed true airspeed.

6.7.1.2 Comply with speed adjustments from ATC unless:

6.7.1.2.1 The minimum or maximum safe airspeed for any particular operation is greater or less than the requested airspeed. In such cases, advise ATC.

6.7.1.2.2 Operating at or above 10,000 feet MSL on an ATC assigned SPEED ADJUSTMENT of more than 250 knots IAS and subsequent clearance is received for descent below 10,000 feet MSL. In such cases, pilots are expected to comply with FAR 97.117(a).

6.7.2 Controller (In U.S. Domestic Class A, B, C, D and E airspaces)

6.7.2.1 Assigns aircraft to speed adjustments when necessary but not as a substitute for good vectoring technique.

6.7.2.2 Adheres to the restrictions of 7110.65 as to when speed adjustment procedures may be applied.

6.7.2.3 Avoids speed adjustments requiring alternate decreases and increases.

6.7.2.4 Assigns speed adjustments to a specified IAS knots/ Mach number or to increase or decrease speed utilizing increments of 10 knots or multiples thereof.

6.7.2.5 Advises pilots to resume normal speed when speed adjustments are no longer required.

6.7.2.6 Gives due consideration to aircraft capabilities to reduce speed while descending

6.7.3 Pilot (In Oceanic Class A and E airspace)

6.7.3.1 If ATC has not assigned an airspeed, advise ATC anytime the true airspeed at cruising level varies or is expected to vary by ±10 knots or 0.02 Mach number, whichever is less, of the filed true airspeed.

6.7.3.2 If ATC has assigned an airspeed, aircraft shall adhere to the ATC assigned airspeed and shall request ATC approval before making any change thereto. If it is essential to make an immediate temporary change in the Mach number (e.g., due to turbulence), ATC shall be notified as soon as possible. If it is not feasible, due to aircraft performance, to maintain the last assigned Mach number during an en route climb or descent, advise ATC at the time of the request.

6.7.4 Controller (In Oceanic Class A and E airspace)

6.7.4.1 Assigns airspeed when necessary for separation of aircraft to comply with FAR, ICAO regulations and procedures, or letters of agreement.

6.8 Traffic Advisories (Traffic Information)

6.8.1 Pilot

6.8.1.1 Acknowledge receipt of traffic advisories.

6.8.1.2 Inform controller if traffic is in sight.

6.8.1.3 Advise ATC if a vector to avoid traffic is desired.

6.8.1.4 Do not expect to receive radar traffic advisories on all traffic. Some aircraft may not appear on the radar display. Be aware that the controller may be occupied with high priority duties and unable to issue traffic information for a variety of reasons.

6.8.1.5 Advise controller if service not desired.

6.8.2 Controller

6.8.2.1 Issues radar traffic to the maximum extent consistent with higher priority duties except in Class A airspace.

6.8.2.2 Provides vectors to assist aircraft to avoid observed traffic when requested by the pilot.

6.8.2.3 Issues traffic information to aircraft in Class D airspace for sequencing purposes

6.9 Safety Alert

6.9.1 Pilot

6.9.1.1 Initiate appropriate action if a safety alert is received from ATC.

6.9.1.2 Be aware that this service is not always available and that many factors affect the ability of the controller to be aware of a situation in which unsafe proximity to terrain, obstructions, or another aircraft may be developing.

6.9.2 Controller

6.9.2.1 Issues a safety alert if he is aware an aircraft under his control is at an altitude which, in the controller's judgment, places the aircraft in unsafe proximity to terrain, obstructions or another aircraft. Types of safety alerts are:

6.9.2.1.1 Terrain/Obstruction Alerts—Immediately issued to an aircraft under his control if he is aware the aircraft is at an altitude believed to place the aircraft in unsafe proximity to terrain/obstruction.

6.9.2.1.2 Aircraft Conflict Alerts—Immediately issued to an aircraft under his control if he is aware of an aircraft not under his control at an altitude believed to place the aircraft in unsafe proximity to each other. With the alert, he offers the pilot an alternative if feasible.

6.9.2.2 Discontinues further alerts if informed by the pilot that he is taking action to correct the situation or that he has the other aircraft in sight.

6.10 See and Avoid

6.10.1 Pilot

6.10.1.1 When meteorological conditions permit, regardless of type of flight plan or whether or not under control of an radar facility, the pilot is responsible to see and avoid other traffic, terrain, or obstacles.

6.10.2 Controller

6.10.2.1 Provides radar traffic information to radar identified aircraft operating outside positive control airspace on a workload permitting basis.

6.10.2.2 Issues a safety advisory to an aircraft under his control if he is aware the aircraft is at an altitude believed to place the aircraft in unsafe proximity to terrain, obstructions or other aircraft.

6.11 Visual Approach

6.11.1 Pilot

6.11.1.1 If a visual approach is not desired, advise ATC

6.11.1.2 Comply with controller's instructions for vectors toward the airport of intended landing or to a visual position behind a preceding aircraft.

6.11.1.3 After being cleared for a visual approach, proceed to the airport in a normal manner or follow designated traffic and/ or charted flight procedures, as appropriate, remaining in VFR at all times.

6.11.1.4 Acceptance of a visual approach clearance to visually follow a preceding aircraft is pilot acknowledgement that he will establish a safe landing interval behind the preceding aircraft and that he accepts responsibility for his own wake turbulence separation.

6.11.1.5 Advise ATC immediately if you are unable to continue following a designated aircraft or encounter less than basic VFR weather conditions.

6.11.1.6 Be aware that radar service is automatically terminated, without advising the pilot, when the aircraft is instructed to change to advisory frequency.

6.11.1.7 Be aware that there may be other traffic in traffic pattern and the landing sequence may differ from the traffic sequence assigned by the approach control or air route traffic control center.

6.11.2 Controller

6.11.2.1 Does not vector an aircraft for a visual approach to an airport with weather reporting service unless the reported ceiling at the airport is 500 feet or more above the MVA and visibility is 3 miles or more.

6.11.2.2 Informs the pilot when weather is not available for the destination airport and does not vector for a visual approach to those airports unless there is reasonable assurance that descent and flight to the airport can be made in VFR conditions.

6.11.2.3 Does not clear an aircraft for a visual approach unless the aircraft is and can remain in VFR conditions.

6.11.2.4 Issues visual approach clearance when the pilot reports sighting the airport or a preceding aircraft which is to be followed.

6.11.2.5 Provides separation except when visual separation is being applied by the pilot of the aircraft executing the visual approach.

6.11.2.6 Continues flight following and traffic information until the aircraft has landed or has been instructed to change to advisory frequency.

6.11.2.7 Informs the pilot conducting the visual approach of the aircraft class when pertinent traffic is known to be a heavy aircraft.

6.12 Visual Separation

6.12.1 Pilot

6.12.1.1 Acceptance of instructions to follow another aircraft or to provide visual separation from it is an acknowledgment that the pilot will maneuver his/her aircraft as necessary to avoid the other aircraft or to maintain intrail separation.

6.12.1.2 If instructed by ATC to follow another aircraft or to provide visual separation from it, promptly notify the controller if you lose sight of that aircraft, are unable to maintain continued visual contact with it, or cannot accept the responsibility for your own separation for any reason.

6.12.1.3 The pilot also accepts responsibility for wake turbulence separation under these conditions.

6.12.2 Controller

6.12.2.1 Applies visual separation only:

6.12.2.1.1 In conjunction with visual approaches.

6.12.2.1.2 Within the terminal area when a controller has both aircraft in sight or by instructing a pilot who sees the other aircraft to maintain visual separation from it.

6.12.2.1.3 Within en route airspace when aircraft are on opposite courses and one pilot reports having seen the other aircraft and that the aircraft have passed each other.

6.13 VFR-ON-TOP

6.13.1 Pilot

6.13.1.1 This clearance must be requested by the pilot on an IFR flight plan and if approved, permits the pilot to select an altitude or flight level of his choice (subject to any ATC restrictions) in lieu of an assigned altitude.

Note 1. — VFR-ON-TOP is not permitted in certain airspace areas, such as positive control airspace, certain restricted areas, etc. Consequently, IFR flights operating VFR-ON-TOP will avoid such airspace.

Note 2. — See related AIP paragraphs, RAC 3.4;3.2, Rules Pertaining to IFR Aircraft in Class A, B, C, D and E airspace; RAC 3.3;4, IFR Clearance VFR-ON-TOP; RAC 3.3;5.3, IFR Separation Standards; RAC 3.5;4, Position Reporting; and RAC 3.5;5, Additional Reports.

6.13.1.2 By requesting a VFR-ON-TOP clearance, the pilot indicates that he is assuming the sole responsibility to be vigilant so as to see and avoid other aircraft and that he will:

6.13.1.2.1 Fly at the appropriate VFR altitude as prescribed in FAR 91.159.

6.13.1.2.2 Comply with the VFR visibility and distance from criteria in FAR 91.155 (Basic VFR Weather Minimums).

6.13.1.2.3 Comply with instrument flight rules that are applicable to this flight; i.e., minimum IFR altitudes, position reporting, radio communications, course to be flown, adherence to ATC clearance, etc.

6.13.1.3 Should advise ATC prior to any altitude change to ensure the exchange of accurate traffic information.

6.13.2 Controller

6.13.2.1 May clear an aircraft to maintain VFR-ON-TOP if the pilot of an aircraft on an IFR flight plan requests the clearance.

6.13.2.2 Inform the pilot of an aircraft cleared to climb to VFR-ON-TOP: the reported height of the tops or that no top report is available, issues an alternate clearance if necessary, and once the aircraft reports reaching VFR-ON-TOP, reclears the aircraft to maintain VFR-ON-TOP.

6.13.2.3 Before issuing clearance, ascertains that the aircraft is not in or will not enter positive control airspace.

6.14 Instrument Departures

6.14.1 Pilot

6.14.1.1 Prior to Departure,: consider the type of terrain and other obstructions on or in the vicinity of the departure airport.

6.14.1.2 Determine if obstruction avoidance can be maintained visually or that the departure procedure should be followed.

6.14.1.3 Determine whether a departure procedure and/or Standard Instrument Departure (SID) is available for obstruction avoidance.

6.14.1.4 At airports where instrument approach procedures have not been published, hence no published departure procedure, determine what action will be necessary and take such action that will assure a safe departure.

6.14.2 Controller

6.14.2.1 At locations with airport traffic control service, when necessary, specifies direction of takeoff/turn or initial heading to be flown after takeoff.

6.14.2.2 At locations without airport traffic control service but within Class E surface area, when necessary to specify direction of takeoff/turn or initial heading to be flown, obtains pilot's concurrence that the procedure will allow him to comply with local traffic patterns, terrain, and obstruction avoidance.

6.14.2.3 Includes established departure procedures as part of the air traffic control clearance when pilot compliance is necessary to ensure separation.

6.15 Minimum Fuel Advisory.

6.15.1 Pilot

6.15.1.1 Advise ATC of your "minimum fuel" status when your fuel supply has reached a state where, upon reaching destination, you cannot accept any undue delay.

6.15.1.2 Be aware that this is not an emergency situation but merely an advisory that indicates an emergency situation is possible should any undue delay occur.

6.15.1.3 Be aware that a minimum fuel advisory does not imply a need for traffic priority.

6.15.1.4 If the remaining usable fuel supply suggests the need for traffic priority to ensure a safe landing, you should declare an emergency account low fuel, and report the fuel remaining in minutes.

6.15.2 Controller

6.15.2.1 When an aircraft declares a state of "minimum fuel," relay this information to the facility to whom control jurisdiction is transferred.

6.15.2.2 Be alert for any occurrence which might delay the aircraft.

7. TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (TCAS I & II)

7.1 TCAS I provides proximity warning only, to assist the pilot in the visual acquisition of intruder aircraft. No recommended avoidance maneuvers are provided nor authorized as a direct result of a TCAS I warning. It is intended for use by smaller commuter aircraft holding 10 to 30 passenger seats, and general aviation aircraft.

AIRSPACE

1. GENERAL

1.1 General

There are two categories of airspace or airspace areas; regulatory and nonregulatory. Within these two categories, there are controlled, uncontrolled, special use, and other airspace area types. The categories and types of airspace are dictated by: (1) the complexity or density of aircraft movements; (2) the nature of the operations conducted within the airspace; and (3) the level of safety required; and (4) the national and public interest. It is important that pilots be familiar with the operational requirements for each of the various types or classes of airspace. Subsequent sections will cover each category and class in sufficient detail to facilitate understanding.

1.2 General Dimensions of Airspace Segments

Refer to Federal Aviation Regulations (FAR) for specific dimensions, exceptions, geographical areas covered, exclusions, specific transponder or equipment requirements, and flight operations.

1.3 Basic VFR Weather Minimums

No person may operate an aircraft under basic VFR when the flight visibility is less, or at a distance from clouds that is less, than that prescribed for the corresponding altitude and class of airspace. (See RAC 3.4, Appendix One for a tabular presentation of these rules).

Note. — Student pilots must comply with Part 61.89(a) (6) and (7).

1.4 VFR Cruising Altitudes and Flight Levels

VFR cruising altitudes and flight levels are presented in tabular form in RAC 3.4, Appendix Two.

2. CONTROLLED AIRSPACE

2.1 General

2.1.1 Controlled Airspace: A generic term that covers the different classification of airspace (Class A, Class B, Class C, Class D, and Class E airspace) and defined dimensions within which air traffic control service is provided to IFR flights and to VFR flights in accordance with the airspace classification. (See RAC 3.4, Appendix Three for Airspace Classes).

2.1.2 IFR Requirements: IFR operations in any class of controlled airspace requires that a pilot must file an IFR flight plan and receive an appropriate ATC clearance.

2.1.3 IFR Separation: Standard IFR separation is provided to all aircraft operating under IFR in controlled airspace.

2.1.4 VFR Requirements: It is the responsibility of the pilot to insure that ATC clearance or radio communication requirements are met prior to entry into Class B, Class C, or Class D airspace. The pilot retains this responsibility when receiving ATC radar advisories. See FAR Part 91.

2.1.5 Traffic Advisories: Traffic advisories will be provided to all aircraft as the controller's work situation permits.

2.1.6 Safety Alerts: Safety Alerts are mandatory services and are provided to ALL aircraft. There are two types of Safety Alerts, Terrain/Obstruction Alert and Aircraft Conflict/Mode C Intruder Alert.

2.1.7 Terrain/Obstruction Alert. A Terrain/Obstruction Alert is issued when, in the controller's judgment, an aircraft's altitude places it in unsafe proximity to terrain and/or obstructions.

2.1.8 Aircraft Conflict/Mode C Intruder Alert. An Aircraft Conflict/Mode C Intruder Alert is issued if the controller observes another aircraft which places it in an unsafe proximity. When feasible, the controller will offer the pilot an alternative course of action.

2.1.9 Ultralight Vehicles: No person may operate an ultralight vehicle within Class A, Class B, Class C, or Class D airspace or within the lateral boundaries of the surface area of Class E airspace designated for an airport unless that person has prior authorization from the ATC facility having jurisdiction over that airspace. See FAR Part 103.

2.1.10 Unmanned Free Balloons: Unless otherwise authorized by ATC, no person may operate an unmanned free balloon below 2,000 feet above the surface within the lateral boundaries of Class B, Class C, Class D, or Class E airspace designated for an airport. See FAR Part 101.

2.1.11 Parachute Jumps: No person may make a parachute jump, and no pilot in command may allow a parachute jump to be made from that aircraft, in or into Class A, Class B, Class C, or Class D airspace without, or in violation of, the terms of an ATC authorization issued by the ATC facility having jurisdiction over the airspace. See FAR Part 105.

2.2 Class A Airspace

2.2.1 Definition: Generally, that airspace from 18,000 feet MSL up to and including FL600, including the airspace overlying the waters within 12 nautical miles of the coast of the 48 contiguous States and Alaska; and designated international airspace beyond 12 nautical miles of the coast of the 48 contiguous States and Alaska within areas of domestic radio navigational signal or ATC radar coverage, and within which domestic procedures are applied.

2.2.2 Operating Rules and Pilot/Equipment Requirements: Unless otherwise authorized, all persons must operate their aircraft under IFR. See FAR Part 71.33 and Part 91.167 through Part 91.193.

2.2.3 Charts: Class A airspace is not specifically charted.

2.3 Class B Airspace

2.3.1 Definition: Generally, that airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports in terms of IFR operations or passenger enplanements. The configuration of each Class B airspace area is individually tailored and consists of a surface area and two or more layers (some Class B airspace areas resemble upside-down wedding cakes), and is designed to contain all published instrument procedures once an aircraft enters the airspace. An ATC clearance is required for all aircraft to operate in the area, and all aircraft that are so cleared receive separation services within the airspace.

The cloud clearance requirement for VFR operations is "clear of clouds."

2.3.2 Operating Rules and Pilot/Equipment Requirements for VFR Operations: Regardless of weather conditions, an ATC clearance is required prior to operating within Class B airspace. Pilots should not request a clearance to operate within Class B airspace unless the requirements of FAR Part 91.215 and Part 91.131 are met. Included among these requirements are:

2.3.2.1 Unless otherwise authorized by ATC, aircraft must be equipped with an operable two-way radio capable of communicating with ATC on appropriate frequencies for that Class B airspace.

2.3.2.2 No person may take off or land a civil aircraft at the following primary airports within Class B airspace unless the pilot in command holds at least a private pilot certificate:

- Andrews Air Force Base, MD
- Atlanta Hartsfield Airport, GA
- Boston Logan Airport, MA
- Chicago O'Hare Intl Arpt, IL
- Los Angeles Intl Airport, CA
- Miami Intl Airport, FL
- Newark Intl Airport, NJ
- New York Kennedy Airport, NY
- New York La Guardia Arpt, NY
- San Francisco Intl Airport, CA
- Washington National Arpt, DC
- Dallas/Fort Worth Intl Arpt, TX

2.3.2.3 No person may take off or land a civil aircraft at an airport within Class B airspace or operate a civil aircraft within Class B airspace unless:

2.3.2.3.1 The pilot in command holds at least a private pilot certificate; or,

2.3.2.3.2 The aircraft is operated by a student pilot or recreational pilot who seeks private pilot certification and has met the requirements of FAR Part 61.95.

2.3.2.4 Unless otherwise authorized by ATC, each person operating a large turbine engine-powered airplane to or from a primary airport shall operate at or above the designated floors while within the lateral limits of Class B airspace.

2.3.2.5 Unless otherwise authorized by ATC, each aircraft must be equipped as follows:

2.3.2.5.1 For IFR operations, an operable VOR or TACAN receiver; and

2.3.2.5.2 For all operations, a two-way radio capable of communications with ATC on appropriate frequencies for that area; and

2.3.2.5.3 Unless otherwise authorized by ATC, an operable radar beacon transponder with automatic altitude reporting equipment.

Note. — ATC may, upon notification, immediately authorize a deviation from the altitude reporting equipment requirement; however, a request for a deviation from the 4096 transponder equipment requirement must be submitted to the controlling ATC facility at least one hour before the proposed operation. (See RAC 1, Transponder Operation).

2.3.3 Charts: Class B airspace is charted on Sectional Charts, IFR En Route Low Altitude, and Terminal Area Charts.

2.3.4 Flight Procedures:

2.3.4.1 Flights: Aircraft within Class B airspace are required to operate in accordance with current IFR procedures. A clearance for a visual approach to a primary airport is not authorization for turbine powered airplanes to operate below the designated floors of the Class B airspace.

2.3.4.2 VFR Flights:

2.3.4.2.1 Arriving aircraft must obtain an ATC clearance prior to entering Class B airspace and must contact ATC on the appropriate frequency, and in relation to geographical fixes shown on local charts. Although a pilot may be operating beneath the floor of the Class B airspace on initial contact, communications with ATC should be established in relation to the points indicated for spacing and sequencing purposes.

2.3.4.2.2 Departing aircraft require a clearance to depart Class B airspace and should advise the clearance delivery position of their intended altitude and route of flight. ATC will normally advise VFR aircraft when leaving the geographical limits of the Class B airspace. Radar service is not automatically terminated with this advisory unless specifically stated by the controller.

2.3.4.2.3 Aircraft not landing or departing the primary airport may obtain an ATC clearance to transit the Class B airspace when traffic conditions permit and provided the requirements of FAR Part 91.131 are met. Such VFR aircraft are encouraged, to the extent possible, to operate at altitudes above or below the Class B airspace or transit through established VFR corridors. Pilots operating in VFR corridors are urged to use frequency 122.750 mHz for the exchange of aircraft position information.

2.3.5 ATC Clearances and Separation: An ATC clearance is required to enter and operate within Class B airspace. VFR pilots are provided sequencing and separation from other aircraft while operating within Class B airspace. (See RAC 1, Terminal VFR Radar Service).

Note 1. — Separation and sequencing of VFR aircraft will be suspended in the event of a radar outage as this service is dependent on radar. The pilot will be advised that the service is not available and issued wind, runway information and the time or place to contact the tower.

Note 2. — Separation of VFR aircraft will be suspended during CENRAP operations. Traffic advisories and sequencing to the primary airport will be provided on a workload permitting basis. The pilot will be advised when Center Radar Presentation (CENRAP) is in use.

2.3.5.1 VFR aircraft are separated from all VFR/IFR aircraft which weigh 19,000 pounds or less by a minimum of:

2.3.5.1.1 Target resolution, or

2.3.5.1.2 500 feet vertical separation, or

2.3.5.1.3 Visual separation

2.3.5.2 VFR aircraft are separated from all VFR/IFR aircraft which weigh more than 19,000 and turbojets by no less than:

2.3.5.2.1 1 1/2 miles lateral separation, or

2.3.5.2.2 500 feet vertical separation, or

2.3.5.2.3 Visual separation

2.3.5.3 This program is not to be interpreted as relieving pilots of their responsibilities to see and avoid other traffic operating in basic VFR weather conditions, to adjust their operations and flight path as necessary to preclude serious wake encounters, to maintain appropriate terrain and obstruction clearance or to remain in weather conditions equal to or better than the minimums required by FAR Part 91.155. Approach control should be advised and a revised clearance or instruction obtained when compliance with an assigned route, heading and/or altitude is likely to compromise pilot responsibility with respect to terrain and obstruction clearance, vortex exposure, and weather minimums.

2.3.5.4 ATC may assign altitudes to VFR aircraft that do not conform to FAR Part 91.159. **"RESUME APPROPRIATE VFR ALTITUDES"** will be broadcast when the altitude assignment is no longer needed for separation or when leaving Class B airspace. Pilots must return to an altitude that conforms to FAR Part 91.159.

2.3.6 Proximity operations: VFR aircraft operating in proximity to Class B airspace are cautioned against operating too closely to the boundaries, especially where the floor of the Class B airspace is 3,000 feet or less or where VFR cruise altitudes are at or near the floor of higher levels. Observance of this precaution will reduce the potential for encountering an aircraft operating at the altitudes of Class B floors. Additionally, VFR aircraft are encouraged to utilize the VFR Planning Chart as a tool for planning flight in proximity to Class B airspace. Charted VFR Flyway Planning charts are published on the back of the existing VFR Terminal Area Charts.

2.4 Class C Airspace

2.4.1 Definition: Generally, that airspace from the surface to 4,000 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower, are serviced by a radar approach control, and that have a certain number of IFR operations or passenger enplanements. Although the configuration of each Class C airspace area is individually tailored, the airspace usually consists of a surface area with a 5NM radius, and an outer area with a 10NM radius that extends from 1,200 feet to 4,000 feet above the airport elevation.

2.4.2 Outer Area: The normal radius will be 20NM, with some variations based on site specific requirements. The outer area extends outward from the primary airport and extends from the lower limits of radar/radio coverage up to the ceiling of the approach control's delegated airspace, excluding the Class C airspace and other airspace as appropriate.

2.4.3 Charts: Class C airspace is charted on Sectional Charts, IFR En Route Low Altitude, and Terminal Area Charts where appropriate.

2.4.4 Operating Rules and Pilot/Equipment Requirements:

2.4.4.1 Pilot Certification: No specific certification required.

2.4.4.2 Equipment:

2.4.4.2.1 Two-way radio, and

2.4.4.2.2 Unless otherwise authorized by ATC, an operable radar beacon transponder with automatic altitude reporting equipment.

2.4.4.3 Arrival or Through Flight Entry Requirements: Two-way radio communication must be established with the ATC facility providing ATC services prior to entry and thereafter maintain those communications while in Class C airspace. Pilots of arriving aircraft should contact the Class C airspace ATC facility on the publicized frequency and give their position, altitude, radar beacon code, destination, and request Class C service. Radio contact should be initiated far enough from the Class C airspace boundary to preclude entering Class C airspace before two-way radio communications are established.

Note 1. — If the controller responds to a radio call with, "(aircraft callsign) standby," radio communications have been established and the pilot can enter the Class C airspace.

Note 2. — If workload or traffic conditions prevent immediate provision of Class C services, the controller will inform the pilot to remain outside the Class C airspace until conditions permit the services to be provided.

Example:

[aircraft callsign] "Remain Outside the Class C Airspace and Standby."

Note 3. — It is important to understand that if the controller responds to the initial radio call WITHOUT using the aircraft identification, radio communications have not been established and the pilot may not enter the Class C airspace.

Example:

"Aircraft Calling Dulles Approach Control, Standby."

2.4.4.4 Departures from:

2.4.4.4.1 A primary or satellite airport with an operating control tower: Two-way radio communications must be established and maintained with the control tower, and thereafter as instructed by ATC while operating in Class C airspace.

2.4.4.4.2 A satellite airport without an operating control tower: Two-way radio communications must be established as soon as practicable after departing with the ATC facility having jurisdiction over the Class C airspace.

2.4.4.5 Aircraft Speed: Unless otherwise authorized or required by ATC, no person may operate an aircraft at or below 2,500 feet above the surface within 4 nautical miles of the primary airport of a Class C airspace area at an indicated airspeed of more than 200 knots (230 mph).

2.4.5 Air Traffic Services: When two-way radio communications and radar contact are established, all participating VFR aircraft are:

2.4.5.1 Sequenced to the primary airport

2.4.5.2 Provided Class C services within the Class C airspace and the Outer Area.

2.4.5.3 Provided basic radar services beyond the outer area on a workload permitting basis. This can be terminated by the controller if workload dictates.

2.4.6 Aircraft Separation: Separation is provided within the Class C airspace and the Outer Area after two-way radio communications and radar contact are established. VFR aircraft are separated from IFR aircraft within the Class C airspace by any of the following:

2.4.6.1 Visual separation.

2.4.6.2 500 feet vertical; except when operating beneath a heavy jet.

2.4.6.3 Target resolution.

Note 1. — Separation and sequencing of VFR aircraft will be suspended in the event of a radar outage as this service is dependent on radar. The pilot will be advised that the service is not available and issued wind, runway information and the time or place to contact the tower.

Note 2. — Separation of VFR aircraft will be suspended during CENRAP operations. Traffic advisories and sequencing to the primary airport will be provided on a workload permitting basis. The pilot will be advised when CENRAP is in use.

Note 3. — Pilot participation is voluntary within the outer area and can be discontinued, within the outer area, at the pilots request. Class C services will be provided in the outer area unless the pilot requests termination of the service.

Note 4. — Some facilities provide Class C services only during published hours. At other times, terminal IFR radar service will be provided. It is important to note that the communications requirements for entry into the airspace and transponder Mode C requirements are in effect at all times.

2.4.7 Secondary Airports:

2.4.7.1 In some locations Class C airspace may overlie the Class D surface area of a secondary airport. In order to allow that control tower to provide service to aircraft, portions of the overlapping Class C airspace may be procedurally excluded when the secondary airport tower is in operation. Aircraft operating in these procedurally excluded areas will only be provided airport traffic control services when in communication with the secondary airport tower.

2.4.7.2 Aircraft proceeding inbound to a satellite airport will be terminated at a sufficient distance to allow time to change to the appropriate tower or advisory frequency. Class C services to these aircraft will be discontinued when the aircraft is instructed to contact the tower or change to advisory frequency.

2.4.7.3 Aircraft departing secondary controlled airports will not receive Class C services until they have been radar identified and two-way communications have been established with the Class C airspace facility.

2.4.8 This program is not to be interpreted as relieving pilots of their responsibilities to see and avoid other traffic operating in basic VFR weather conditions, to adjust their operations and flight path as necessary to preclude serious wake encounters, to maintain appropriate terrain and obstruction clearance or to remain in weather conditions equal to or better than the minimums required by FAR Part 91.155. Approach control should be advised and a revised clearance or instruction obtained when compliance with an assigned route, heading and/or altitude is likely to compromise pilot responsibility with respect to terrain and obstruction clearance, vortex exposure, and weather minimums.

2.5 Class D Airspace

2.5.1 Definition: Generally, that airspace from the surface to 2,500 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower. The configuration of each Class D airspace area is individually tailored and when instrument procedures are published, the airspace will normally be designed to contain the procedures.

2.5.2 Operating Rules and Pilot/Equipment Requirements:

2.5.2.1 Pilot Certification: No specific certification required.

2.5.2.2 Equipment: Unless otherwise authorized by ATC, an operable two-way radio is required.

2.5.2.3 Arrival or Through Flight Entry Requirements: Two-way radio communication must be established with the ATC facility providing ATC services prior to entry and thereafter maintain those communications while in the Class D airspace. Pilots of arriving aircraft should contact the control tower on the publicized frequency and give their position, altitude, destination, and any request(s). Radio contact should be initiated far enough from the Class D airspace boundary to preclude entering the Class D airspace before two-way radio communications are established.

Note 1. — If the controller responds to a radio call with, [aircraft callsign] "STANDBY", radio communications have been established and the pilot can enter the Class D airspace.

Note 2. — If workload or traffic conditions prevent immediate entry into Class D airspace, the controller will inform the pilot to remain outside the Class D airspace until conditions permit entry.

Example:

[aircraft callsign] "Remain Outside The Class D Airspace And Standby."

Note 3. — It is important to understand that if the controller responds to the initial radio call without using the aircraft callsign, radio communications have not been established and the pilot may not enter the Class D airspace.

Example:

"Aircraft Calling Manassas Tower Standby."

NOTE 4.—At those airports where the control tower does not operate 24 hours a day, the operating hours of the tower will be listed on the appropriate charts and in the AFD. During the hours the tower is not in operation the Class E surface area rules are applicable.

2.5.2.4 Departures from:

2.5.2.4.1 A primary or satellite airport with an operating control tower: Two-way radio communications must be established and maintained with the control tower, and thereafter as instructed by ATC while operating in the Class D airspace.

2.5.2.4.2 A satellite airport without an operating control tower: Two-way radio communications must be established as soon as practicable after departing with the ATC facility having jurisdiction over the Class D airspace as soon as practicable after departing.

2.5.2.5 Aircraft Speed: Unless otherwise authorized or required by ATC, no person may operate an aircraft at or below 2,500 feet above the surface within 4 nautical miles of the primary airport of a Class D airspace area at an indicated airspeed of more than 200 knots (230 mph).

2.5.3 Class D airspace areas are depicted on Sectional and Terminal charts with blue segmented lines, and on IFR En Route Lows with a boxed [D].

2.5.4 Arrival extensions for instrument approach procedures may be Class D or Class E airspace. As a general rule, if all extensions are 2 miles or less, they remain part of the Class D surface area. However, if any one extension is greater than 2 miles, then all extensions become Class E.

2.5.5 Separation for VFR Aircraft: No separation services are provided to VFR aircraft.

2.6 Class E Airspace

2.6.1 Definition: Generally, if the airspace is not Class A, Class B, Class C, or Class D, and it is controlled airspace, it is Class E airspace.

2.6.2 Operating Rules and Pilot/Equipment Requirements:

2.6.2.1 Pilot Certification: No specific certification required.

2.6.2.2 Equipment: No specific equipment required by the airspace.

2.6.2.3 Arrival or Through Flight Entry Requirements: No specific requirements.

2.6.3 Charts: Class E airspace below 14,500 feet MSL is charted on Sectional, Terminal, World, and IFR En Route Low Altitude charts.

2.6.4 Vertical limits: Except for 18,000 feet MSL, Class E airspace has no defined vertical limit but rather it extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace.

2.6.5 Types of Class E Airspace:

2.6.5.1 Surface area designated for an airport: When designated as a surface area for an airport, the airspace will be configured to contain all instrument procedures.

2.6.5.2 Extension to a surface area: There are Class E airspace areas that serve as extensions to Class B, Class C, and Class D surface areas designated for an airport. Such airspace provides controlled airspace to contain standard instrument approach procedures without imposing a communications requirement on pilots operating under VFR.

2.6.5.3 Airspace used for transition: There are Class E airspace areas beginning at either 700 or 1,200 feet AGL used to transition to/from the terminal or en route environment.

2.6.5.4 En Route Domestic Areas: There are Class E airspace areas that extend upward from a specified altitude and are en route domestic airspace areas that provide controlled airspace in those areas where there is a requirement to provide IFR en route ATC services but the Federal airway system is inadequate.

2.6.5.5 Federal Airways: The Federal airways are Class E airspace areas and, unless otherwise specified, extend upward from 1,200 feet to, but not including, 18,000 feet MSL. The colored airways are Green, Red, Amber, and Blue. The VOR airways are classified as Domestic, Alaskan, and Hawaiian.

2.6.5.6 Offshore Airspace Areas: There are Class E airspace areas that extend upward from a specified altitude to, but not including, 18,000 feet MSL and are designated as offshore airspace areas. These areas provide controlled airspace beyond 12 miles from the coast of the United States in those areas where there is a requirement to provide IFR en route ATC services and within which the United States is applying domestic procedures.

2.6.5.7 Unless designated at a lower altitude, Class E airspace begins at 14,500 MSL over the United States, including that airspace overlying the waters within 12 nautical miles of the coast of the 48 contiguous States and Alaska excluding the Alaska peninsula west of long. 160°00'00''W; and the airspace less than 1,500 feet above the surface of the earth.

2.6.6 Separation for VFR Aircraft: No separation services are provided to VFR aircraft.

3. CLASS G AIRSPACE

3.1 General

Class G airspace is that portion of the airspace that has not been designated as Class A, Class B, Class C, Class D and Class E airspace (uncontrolled).

3.2 VFR Requirements

Rules governing VFR flight have been adopted to assist the pilot in meeting his responsibility to see and avoid other aircraft. Minimum flight visibility and distance from clouds required for VFR flight are contained in FAR Part 91.155. (See RAC 3.4, Appendix One for a tabular presentation of these rules).

3.3 IFR Requirements

3.3.1 The FARs specify the pilot and aircraft equipment requirements for IFR flight. Pilots are reminded that in addition to altitude or flight level requirements, FAR Part 91.177 includes a requirement to remain at least 1,000 feet (2,000 feet in designated mountainous terrain) above the highest obstacle within a horizontal distance of 4 nautical miles from the course to be flown.

3.3.2 IFR Altitudes and Flight Levels. (See RAC 3.4, Appendix Two for a tabular presentation of these rules).

4. OTHER AIRSPACE AREAS

4.1 Airport Advisory Area

4.1.1 The airport advisory area is the area within 10 statute miles of an airport where a control tower is not operating but where a FSS is located. At such locations, the FSS provides advisory service to arriving and departing aircraft. (See RAC 7, Traffic Advisory Practices at Airports Without Operating Control Towers).

4.1.2 It is not mandatory that pilots participate in the Local Airport Advisory program, but it is strongly recommended that they do.

4.2 Published VFR Routes

Published VFR routes for transitioning around, under and through complex airspace such as Class B airspace were developed through a number of FAA and industry initiatives. All of the following terms, i.e., "VFR Flyway", "VFR Corridor" "Class B Airspace VFR Transition Route" and "Terminal Area VFR Route" have been used when referring to the same or different types of routes or airspace. The following paragraphs identify and clarify the functionality of each type of route, and specify where and when an ATC clearance is required.

4.2.1 VFR Flyways

4.2.1.1 VFR Flyways and their associated Flyway Planning charts were developed from the recommendations of a National Airspace Review Task Group. A VFR Flyway is defined as a general flight path not defined as a specific course, for use by pilots in planning flights into, out of, through or near complex terminal airspace to avoid Class B airspace. An ATC clearance is NOT required to fly these routes.

4.2.1.2 VFR Flyways are depicted on the reverse side of some of the VFR Terminal Area Charts (TAC), commonly referred to as Class B airspace charts. (See RAC 3.4; Appendix Four). Eventually all TAC's will include a VFR Flyway Planning Chart. These charts identify VFR flyways designed to help VFR pilots avoid major controlled traffic flows. They may further depict multiple VFR routings throughout the area which may be used as an alternative to flight within Class B airspace. The ground references provide a guide for improved visual navigation. These routes are not intended to discourage requests for VFR operations within Class B airspace but are designed solely to assist pilots in planning for flights under and around busy Class B airspace without actually entering Class B airspace.

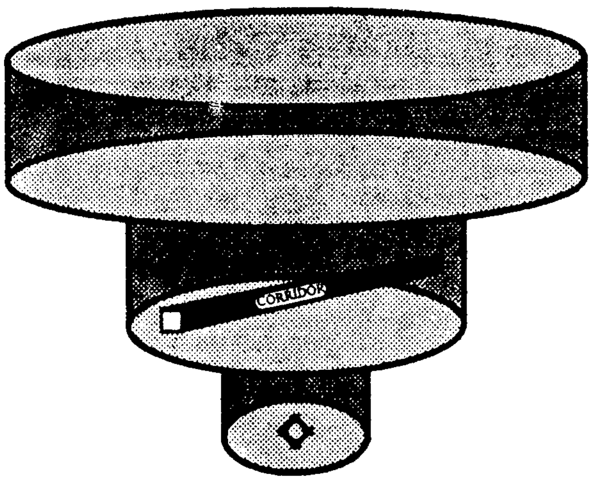
4.2.1.3 It is very important to remember that these suggested routes are not sterile of other traffic. The entire Class B airspace, and the airspace underneath it, may be heavily congested with many different types of aircraft. Pilot adherence to VFR rules must be exercised at all times. Further, when operating beneath Class B airspace, communications must be established and maintained between your aircraft and any control tower while transiting the Class B, Class C, and Class D surface areas of those airports under Class B Airspace.

4.2.2 VFR Corridors

4.2.2.1 The design of a few of the first Class B airspace areas provided a corridor for the passage of uncontrolled traffic. A VFR corridor is defined as Airspace through Class B airspace, with defined vertical and lateral boundaries, in which aircraft may operate without an ATC clearance or communication with air traffic control.

4.2.2.2 These corridors are, in effect, a "hole" through Class B airspace. (See Class B Airspace Illustration). A classic example would be the corridor through the Los Angeles Class B airspace, which has been subsequently changed to Special Flight Rules airspace (SFR). A corridor is surrounded on all sides by Class B airspace and does not extend down to the surface like a VFR Flyway. Because of their finite lateral and vertical limits, and the volume of VFR traffic using a corridor, extreme caution and vigilance must be exercised.

4.2.2.3 Because of the heavy traffic volume and the procedures necessary to efficiently manage the flow of traffic, it has not been possible to incorporate VFR corridors in the development or modifications of Class B airspace in recent years.



4.2.3 Class B airspace VFR Transition Routes

4.2.3.1 To accommodate VFR traffic through certain Class B airspace, such as Seattle, Phoenix and Los Angeles, Class B Airspace VFR Transition Routes were developed. A Class B Airspace VFR Transition Route is defined as a specific flight course depicted on a Terminal Area Chart (TAC) for transiting a specific Class B airspace. These routes include specific ATC-assigned altitudes, and pilots must obtain an ATC clearance prior to entering Class B airspace on the route.

4.2.3.2 These routes, as depicted in RAC 3.4; Appendix Five, are designed to show the pilot where to position his/her aircraft outside of, or clear of, the Class B airspace where an ATC clearance can normally be expected with minimal or no delay. Until ATC authorization is received, pilots must remain clear of Class B airspace. On initial contact, pilots should advise ATC of their position, altitude, route name desired, and direction of flight. After a clearance is received, pilot must fly the route as depicted and, most importantly, adhere to ATC instructions.

4.2.4 Terminal Area VFR Routes

4.2.4.1 Terminal Area VFR Routes were developed from a concept evaluated in the Los Angeles Basin area in 1988-89, and are being developed for other terminal areas around the country. Charts depicting these routes were developed in a joint effort between the FAA and industry to provide more specific navigation information than the VFR Flyway Planning Charts on the back of the Class B airspace charts. (See RAC 3.4; Appendix Six).

4.2.4.2 A Terminal Area VFR Route is defined as a specific flight course for optional use by pilots to avoid Class B, Class C, and Class D airspace areas while operating in complex terminal airspace. These routes are depicted on the chart(s), may include recommended altitudes, and are described by reference to electronic navigational aids and/or prominent visual landmarks. An ATC clearance is NOT required to fly these routes.

4.3 Terminal Radar Service Area (TRSA)

4.3.1 Background—The terminal radar service areas (TRSA's) were originally established as part of the Terminal Radar Program at selected airports. TRSA's were never controlled airspace from a regulatory standpoint because the establishment of TRSA's were never subject to the rulemaking process; consequently, TRSA's are not contained in FAR Part 71 nor are there any TRSA operating rules in Part 91. Part of the Airport Radar Service Area (ARSA) program was to eventually replace all TRSA's. However, the ARSA requirements became relatively stringent and it was subsequently decided that TRSA's would have to meet ARSA criteria before they would be converted. TRSA's do not fit into any of the U.S. Airspace Classes; therefore, they will continue to be non-Part 71 airspace areas where participating pilots can receive additional radar services which have been redefined as TRSA Service.

4.3.2 TRSA Areas—The primary airport(s) within the TRSA become Class D airspace. The remaining portion of the TRSA overlies other controlled airspace which is normally Class E airspace beginning at 700 or 1,200 feet and established to transition to/from the enroute/terminal environment.

4.3.3 Participation—Pilot's operating under VFR are encouraged to contact the radar approach control and avail themselves of the TRSA Services. However, participation is voluntary on the part of the pilot. See RAC 1 for details and procedures.

4.3.4 Charts—TRSA's are depicted on visual charts with a solid black line and altitudes for each segment. The Class D portion is charted with a blue segmented line.

4.4 Suspension Of The Transponder And Automatic Altitude Reporting Equipment Requirements For Operations In The Vicinity Of Designated Mode C Veil Airports

4.4.1 Pursuant to Special Federal Aviation Regulation (SFAR) No. 62, aircraft operating in the vicinity of the airports listed below are excluded from the Mode C transponder equipment requirements of Federal Aviation Regulation FAR Part 91.215(b)(2). The exclusion from the Mode C transponder equipment requirement only applies to those operations at or below the altitude specified for each airport that are: (1) within a 2-nautical mile radius of a listed airport: and (2) along a direct route between that airport and the outer boundary of the Mode C veil. The routing must be consistent with established traffic patterns, noise abatement procedures, and safety. The designation of altitudes for each airport is not intended to supersede the provisions of FAR Part 91.119, Minimum Safe Altitudes. Routings to and from each airport are intentionally unspecified to permit the pilot, complying with FAR Part 91.119, to avoid operating over obstructions, noisesensitive areas, etc. Further, should the pilot of an aircraft intending to operate into or out of an airport listed in the SFAR determine that the operation at or below the specified altitude is unsafe due to meteorological conditions, aircraft operating characteristics, or other factors, the pilot should seek relief from the Mode C transponder requirement via the ATC authorization process.

4.4.2 Airports at which the Mode C transponder equipment requirements of FAR Part 91.215(b)(2) do not apply.

ATS REGIONS, ROUTES, CLASS B, C, D AND E SURFACE AREAS, TERMINAL AND OTHER AIRSPACE AREAS

1. GENERAL

1.1 Tabular information concerning the locations, boundaries and limits, vertical and lateral of these areas is not available for presentation in this publication. This information can be made available, upon special request, from the National Flight Data Center (See GEN-1).

1.2 This information if depicted on aeronautical charts (See AIP section MAP).

HOLDING, APPROACH, AND DEPARTURE PROCEDURES

1. GENERAL

1.1 The holding, approach, and departure procedures are contained in RAC-4.

1.2 Differences

See AIP, Section DIF.

2. HOLDING PROCEDURES

2.1 Patterns at the most generally used holding fixes are depicted on U.S. Government or commercially produced (meeting FAA requirements) low/high altitude enroute, area, and STAR charts. Pilots are expected to hold in the pattern depicted unless specifically advised otherwise by ATC. (RAC 3.3—Clearance.)

2.2 ATC clearance requiring an aircraft be held at a fix where the pattern is not charted will include the following information:

(1) Direction of holding from the fix in terms of the eight cardinal compass points; i.e., N, NE, E, SE, etc.

(2) Holding fix (the fix may be omitted if included at the beginning of the transmission as the clearance limit).

(3) Radial, course, bearing, airway, or route on which the aircraft is to hold.

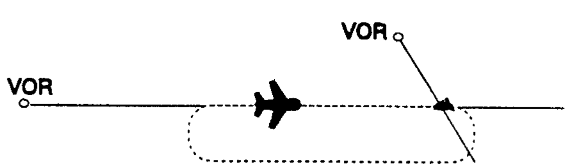
(4) Leg length in miles if DME or RNAV is to be used (leg length will be specified in minutes on pilot request or if the controller considers it necessary).

(5) Direction of turn if left turns are to be made, the pilot requests, or the controller considers it necessary.

(6) Time to expect further clearance, and any pertinent additional delay information.

2.3 Typical Holding Pattern Examples:

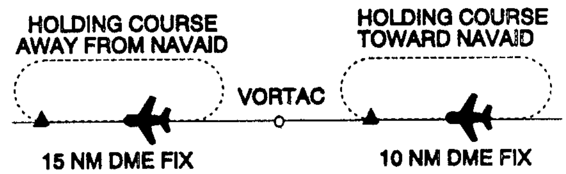
2.3.1 When holding at a VOR station, pilots should begin the turn to the outbound leg at the time of the first complete reversal of the "to-from" indicator. See Two-Way Communications Failure in AIP section SAR-3 for holding at the approach fix when radio failure occurs.



TYPICAL PROCEDURE AT INTERSECTION OF VOR RADIALS

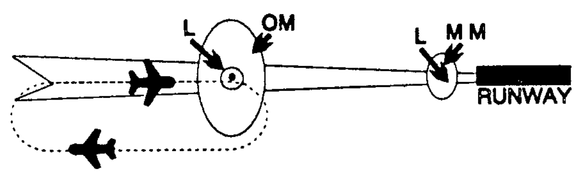
TYPICAL HOLDING PATTERN

2.3.2 Typical Procedure at a DME Fix



TYPICAL PROCEDURE AT A DME FIX

2.3.3 Typical Procedure at an ILS Outer Marker



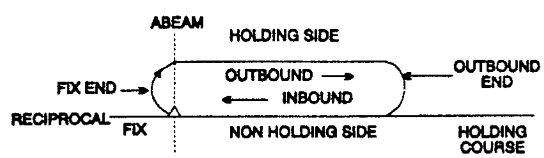
TYPICAL PROCEDURE AT AN ILS OUTER MARKER

2.4 Holding Pattern Airspace Protection

Holding pattern airspace protection is based on the following procedures.

Note—Holding pattern airspace protection design criteria is contained in FAA Handbook 7130.3, "Holding Pattern Criteria."

2.4.1 Descriptive Terms



2.4.1.1 Airspeeds (maximum)

(1) Propeller-driven (including turboprop).	175K IAS
(2) Civil turbojet	
(a) MHA through 14,000 feet	230K IAS
(b) Above 14,000 feet	265K IAS

(3) Military turbojet	
(a) All, except aircraft listed below in (b), (c), and (d).	230K IAS
(b) USAF F-4	280K IAS
(c) F-111, B-1, F-5	310K IAS
(d) T-37	175K IAS

Note 1—Additional military exceptions may be added to (3).

Note 2—Holding speed depends upon weight and drag configuration.

Note 3—Civil aircraft holding at military or joint civil/military use airports should expect to operate at a maximum holding pattern airspeed of 230 knots.

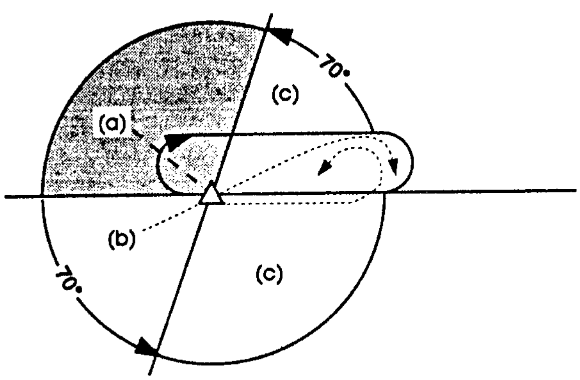
2.4.1.2 Entry Procedures

(1) **Parallel Procedure**—When approaching the holding fix from anywhere in sector (a), the parallel entry procedure would be to turn to a heading to parallel the holding course outbound on the non-holding side for one minute, turn in the direction of the holding pattern thru more than 180 degrees, and return to the holding fix or intercept the holding course inbound.

(2) **Teardrop Procedure**—When approaching the holding fix from anywhere in sector (b), the teardrop entry procedure would be to fly to the fix, turn outbound to a heading for a 30 degree teardrop entry within the pattern (on the holding side) for a period of one minute, then turn in the direction of the holding pattern to intercept the inbound holding course.

(3) **Direct Entry Procedure**—When approaching the holding fix from anywhere in sector (c), the direct entry procedure would be to fly directly to the fix and turn to follow the holding pattern.

(4) While Other entry procedures may enable the aircraft to enter the holding pattern and remain within protected airspace, the parallel, teardrop and direct entries are the procedures for entry and holding recommended by the FAA.



2.4.1.3 Timimg

(1) Inbound Leg—

	At or below 14,000 ft MSL	Above 14,000 ft MSL
INBOUND LEG*	1 min	1 ½ min

*Note—The initial outbound leg should be flown for 1 min. or 1 ½ min. (appropriate to altitude). Timing for subsequent outbound legs should be adjusted as necessary to achieve proper inbound leg time. Pilots may use any navigational means available; i.e., DME, RNAV, etc., to insure the appropriate inbound leg times.

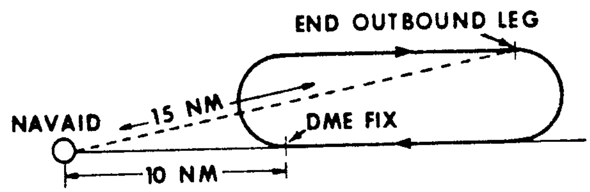
(2) Outbound timing begins over or abeam the fix, whichever occurs later. If the abeam position cannot be determined, start timing when turn to outbound is completed.

2.4.1.4 Distance Measuring Equipment (DME)

DME holding is subject to the same entry and holding procedures except that distances (nautical miles) are used in lieu of time values. The outbound course of a DME holding pattern is called the outbound leg of the pattern. The length of the outbound leg will be specified by the controller. The end of the outbound leg is determined by the odometer reading.

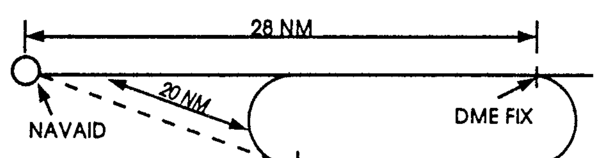
Example:

When the inbound course is toward the NAVAID and the fix distance is 10 NM, and the leg length is 5 NM, then the end of the outbound leg will be reached when the odometer reads 15 NM.



Example:

When the inbound course is away from the NAVAID and the fix distance is 28 NM and the leg length is 8 NM, then the end of the outbound leg will be reached when the odometer reads 20 NM.



2.4.1.5 Pilot Action

(1) Start speed reduction when 3 minutes or less from the holding fix. Cross the holding fix, initially, at or below the maximum holding airspeed.

(2) Make all turns during entry and while holding at: (a) 3° per second, or (b) 30° bank angle, or (c) 25° bank angle pro-

vided a flight director system is used; whichever requires the least bank angle.

(3) Compensate for wind effect primarily by drift correction on the inbound and outbound legs. When outbound, triple the inbound drift correction to avoid major turning adjustments; e.g., if correcting left by 8 degrees when inbound, correct right by 24 degrees when outbound.

(4) Determine entry turn from aircraft heading upon arrival at the holding fix. Plus or minus 5° in heading is considered to be within allowable good operating limits for determining entry.

(5) Advise ATC immediately if any increased airspeed is necessary due to turbulence, icing, etc., or if unable to accomplish any part of the holding procedures. After such higher speeds are no longer necessary, operate according to the appropriate published holding speed and notify ATC.

Note. — Airspace protection for holding in turbulent air is based on a maximum of 280K IAS or Mach 0.8, whichever is lower. Considerable impact on traffic flow will result when turbulent air holding patterns are used; thus, pilot discretion will ensure their use is limited to bona fide conditions/requirements.

2.4.1.6 Nonstandard Holding Pattern

Fix end and outbound end turns are made to the left. Entry procedures to a nonstandard pattern are oriented in relation to the 70° line on the holding side just as in the standard pattern.

2.4.2 Holding Pattern Departure

When holding at a fix and instructions are received specifying the time of departure from the fix, the pilot should adjust his flight path within the limits of the established holding pattern in order to leave the fix at the exact time specified. After departing the holding fix, normal speed is to be resumed with respect to other governing speed requirements such as terminal area speed limits, specific ATC requests, etc. Where the fix is associated with an instrument approach, and timed approaches are in effect, a procedure turn shall not be executed unless the pilot advises ATC, since aircraft holding are expected to proceed inbound on final approach directly from the holding pattern when approach clearance is received.

2.5 Altitude

2.5.1 If an aircraft is established in a published holding pattern at an assigned altitude above the published minimum holding altitude and subsequently cleared for the approach, the pilot may descend to the published minimum holding altitude. The holding pattern would only be a segment of the instrument approach procedure *if* it is published on the instrument procedure chart and is used in lieu of a procedure turn.

2.5.2 For those holding patterns where there are no published minimum holding altitudes, the pilot, upon receiving an approach clearance, must maintain his last assigned altitude until leaving the holding pattern and established on the inbound course. Thereafter, the published minimum altitude of the route segment being flown will apply. It is expected that the pilot will be assigned a holding altitude that will permit a normal descent on the inbound course.

2.6 Radar Surveillance of Outer-Fix Holding Pattern Airspace Areas

2.6.1 Whenever aircraft are holding at an outer fix, ATC will usually provide radar surveillance of the outer fix holding pattern airspace area, or any portion of it, if it is shown on the controller's radar scope.

2.6.2 The controller will attempt to detect any holding aircraft that stray outside the holding pattern airspace area and will assist any detected aircraft to return to the assigned airspace area.

2.6.3 Many factors could prevent ATC from providing this additional service, such as workload, number of targets, precipitation, ground clutter, and radar system capability. These circumstances may make it unfeasible to maintain radar identification of aircraft or to detect aircraft straying from the holding pattern. The provision of this service depends entirely upon whether the controller believes he is in a position to provide it and does not relieve a pilot of his responsibility to adhere to an accepted ATC clearance.

3. APPROACH PROCEDURES

3.1 Approach Control

3.1.1 Approach control is responsible for controlling all instrument flight operating within its area of responsibility. Approach control may serve one or more airfields, and control is exercised primarily by direct pilot/controller communications. Prior to arriving at the destination radio facility, instructions will be received from ARTCC to contact approach control on a specified frequency.

3.2 Radar Approach Control

3.2.1 Where radar is approved for control service, it is used not only for radar approaches (ASR and PAR) but is also used to provide vectors in conjunction with published nonradar approaches based on radio NAVAID's (ILS, MLS, VOR, NDB, TACAN). Radar vectors can provide course guidance and expedite traffic to the final approach course of any established instrument approach procedure or to the traffic pattern for a visual approach. Approach control facilities that provide this radar service will operate in the following manner.

3.2.2 Arriving aircraft are either cleared to an outer fix most appropriate to the route being flown with vertical separation and, if required, given holding information or, when radar handoffs are effected between the ARTCC and approach control, or between two approach control facilities, aircraft are cleared to the airport or to a fix so located that the handoff will be completed prior to the time the aircraft reaches the fix. When radar handoffs are utilized, successive arriving flights may be handed off to approach control with radar separation in lieu of vertical separation. After release to approach control, aircraft are vectored to the appropriate final approach course (ILS, MLS, VOR, ADF, etc). Radar vectors and altitude/flight levels will be issued as required for spacing and separating aircraft. *Therefore, pilots must not deviate from the headings issued by approach control.* Aircraft will normally be informed when it is necessary to vector across the final approach course for spacing or other reasons. If approach course crossing is imminent and the pilot has not been informed that he will be vectored across the final approach course, he should query the controller. The pilot is not expected to turn inbound on the final approach course unless an approach clearance has been issued. This clearance will normally be issued with the final vector for interception of the final approach course, and the vector will be such as to enable the pilot to establish his aircraft on the final approach course prior to reaching the final approach fix. In the case of aircraft already inbound on the final approach course, approach clearance will be issued prior to the aircraft reaching the final approach fix. When established inbound on the final approach course, radar separation will be maintained and the pilot will be expected to complete the approach utilizing the approach aid designated in the clearance (ILS, MLS, VOR, radio beacons, etc.) as the primary means of navigation. Therefore, once established on the final approach course, pilots must not deviate from it unless a clearance to do so is received from air traffic control. After passing the final approach fix on final approach, aircraft are expected to continue inbound on the final approach course and complete the approach or effect the missed approach procedure published for that airport.

3.2.3 Whether aircraft are vectored to the appropriate final approach course or provide their own navigation on published routes to it, radar service is automatically terminated when the landing is completed or when instructed to change to advisory frequency at uncontrolled airports, whichever occurs first.

3.3 Standard Terminal Arrivals (STAR's)

3.3.1 A standard terminal arrival (STAR) is an air traffic control coded instrument flight rules (IFR) arrival route established for application to arriving IFR aircraft destined for certain airports. Its purpose is to simplify clearance delivery procedures.

3.3.2 Pilots of IFR civil aircraft destined to locations for which STAR's have been published may be issued a clearance containing a STAR whenever ATC deems it appropriate. Until military STAR publications and distribution is accomplished, STAR's will be issued to military pilots only when requested in the flight plan or verbally by the pilot.

3.3.3 Use of STAR's requires pilot possession of at least the approved textual description. As with any ATC clearance or portion thereof, it is the responsibility of each pilot to accept or refuse an issued STAR. A pilot should notify ATC if he does not wish to use a STAR by placing "NO STAR" in the remarks section of the flight plan or by the less desirable method of verbally stating the same to ATC.

3.3.4 STAR charts are published in the *Terminal Procedures Publication (TPP) and are available on subscription from the National Ocean Service.*

3.4 Local Flow Control Management Program

3.4.1 This program is a continuing effort by the FAA to enhance safety, minimize the impact of aircraft noise and conserve aviation fuel. The enhancement of safety and reduction of noise is achieved in this program by minimizing low altitude maneuvering of arriving turbojet and turboprop aircraft weighing more that 12,500 pounds and, by permitting departure aircraft to climb to high altitudes sooner, as arrivals are operating at higher altitudes at the points where their flight paths cross. The application of these procedures also reduces exposure time between controlled aircraft and uncontrolled aircraft at the lower altitudes in and around the terminal environment. Fuel conservation is accomplished by absorbing any necessary arrival delays for aircraft included in this program operating at the higher and more fuel efficient altitudes.

3.4.2 A fuel efficient descent is basically an uninterrupted descent (except where level flight is required for speed adjustment) from cruising altitude to the point when level flight is necessary for the pilot to stabilize his final approach. The procedure for a fuel efficient descent is based on an altitude loss which is most efficient for the majority of aircraft being served. This will generally result in a descent gradient window of 250-350 feet per nautical mile.

3.4.3 When crossing altitudes and speed restrictions are issued verbally or are depicted on a chart, ATC will expect the pilot to descend first to the crossing altitude and then reduce speed. Verbal clearances for descent will normally permit an uninterrupted descent in accordance with the procedure as described in paragraph 3.4.2 above. Acceptance of a charted fuel efficient descent (Runway Profile Descent) clearance requires the pilot to adhere to the altitudes, speeds, and headings depicted on the charts unless otherwise instructed by ATC. PILOTS RECEIVING A CLEARANCE FOR A FUEL EFFICIENT DESCENT ARE EXPECTED TO ADVISE ATC IF THEY DO NOT HAVE RUNWAY PROFILE DESCENT CHARTS PUBLISHED FOR THAT AIRPORT OR ARE UNABLE TO COMPLY WITH THE CLEARANCE.

3.5 Advance Information on Instrument Approaches

3.5.1 When landing at airports with approach control services and where two or more instrument approach procedures are published, pilots will be provided in advance of their arrival with the type of approach to expect or that they may be vectored for a visual approach. This information will be broadcast either by a controller or on ATIS. It will not be furnished when the visibility is three miles or better and the ceiling is at or above the highest initial approach altitude established for any low altitude instrument approach procedure for the airport. The purpose of this information is to aid the pilot in planning arrival actions; however, it is not an ATC clearance or commitment and is subject to change. Pilots should bear in mind that fluctuating weather, shifting winds, blocked runway, etc., are conditions which may result in changes to approach information previously received. It is important that the pilot advise ATC immediately if he is unable to execute the approach ATC advised will be used, or if he prefers another type of approach.

3.5.2 When making an IFR approach to an airport not served by a tower or FSS, after the ATC controller advises "CHANGE TO ADVISORY FREQUENCY APPROVED," you should broadcast your intentions, including the type of approach being executed, your position, and when over the final approach fix inbound (non precision approach) or when over the outer marker or the fix used in lieu of the outer marker inbound (precision approach). Continue to monitor the appropriate frequency (UNICOM, etc.) for reports from other pilots.

3.6 Approach Clearance

3.6.1.1 An aircraft which has been cleared to a holding fix and subsequently "cleared . . . approach" has not received new routing. Even though clearance for the approach may have been issued prior to the aircraft reaching the holding fix, ATC would expect the pilot to proceed via the holding fix (his last assigned route), and the feeder route associated with that fix (if a feeder route is published on the approach chart) to the initial approach fix (IAF) to commence the approach. *When cleared for the approach, the published off airway (feeder) routes that lead from the en route structure to the IAF are part of the approach clearance.*

3.6.1.2 If a feeder route to an IAF begins at a fix located along the route of flight prior to reaching the holding fix, and clearance for an approach is issued, a pilot should commence his approach via the published feeder route; i.e., the aircraft would not be expected to overfly the feeder route and return to it. The pilot is expected to commence his approach in a similar manner at the IAF, if the IAF for the procedure is located along the route of flight to the holding fix.

3.6.1.3 If a route of flight directly to the initial approach fix is desired, it should be so stated by the controller with phraseology to include the words "direct . . .," "proceed direct" or a similar phrase which the pilot can interpret without question. If the pilot is uncertain of his clearance, he should immediately query ATC as to what route of flight is desired.

3.6.2 Landing Priority

A clearance for a specific type of approach (ILS, MLS, ADF, VOR, or straight-in approach) to an aircraft operating on an IFR flight plan does not mean that landing priority will be given over other traffic. Traffic control towers handle all aircraft, regardless of the type of flight plan, on a "first-come, first-served" basis. Therefore, because of local traffic or runway in use, it may be necessary for the controller, in the interest of safety, to provide a different landing sequence. In any case, a landing sequence will be issued to each aircraft as soon as possible to enable the pilot to properly adjust his flight path.

3.7 Procedure Turns

3.7.1 A procedure turn is the maneuver prescribed when it is necessary to reverse direction to establish the aircraft inbound on an intermediate or final approach course. It is a required maneuver except when the symbol NoPT is shown, when RADAR VECTORING is provided, when a holding pattern is published in lieu of procedure turn, when conducting a timed approach, or when the procedure turn is not authorized. The altitude prescribed for the procedure turn is a *minimum* altitude until the aircraft is established on the inbound course. The maneuver must be completed within the distance specified in the profile view.

3.7.1.1 On U.S. Government charts, a barbed arrow indicates the direction or side of the outbound course on which the procedure turn is made. Headings are provided for course reversal using the 45 degree type procedure turn. However, the point at which the turn may be commenced and the type and rate of turn is left to the discretion of the pilot. Some of the options are the 45 degree procedure turn, the racetrack pattern, the tear-drop procedure turn, or the 80 degree - 260 degree course reversal. Some procedure turns are specified by procedural track. These turns must be flown exactly as depicted.

3.7.1.2 When the approach procedure involves a procedure turn, a maximum speed of not greater than 250 knots (IAS) should be observed and the turn should be executed within the distance specified in the profile view. The normal procedure turn distance is 10 miles. This may be reduced to a minimum of 5 miles where only Category A or helicopter aircraft are to be operated or increased to as much as 15 miles to accommodate high performance aircraft.

3.7.1.3 A teardrop procedure or penetration turn may be specified in some procedures for a required course reversal. The teardrop procedure consists of departure from an initial approach fix on an outbound course followed by a turn toward and intercepting the inbound course at or prior to the intermediate fix or point. Its purpose is to permit an aircraft to reverse direction and lose considerable altitude within reasonably limited airspace. Where no fix is available to mark the beginning of the intermediate segment, it shall be assumed to commence at a point 10 miles prior to the final approach fix. When the facility is located on the airport, an aircraft is considered to be on final approach upon completion of the penetration turn. However, the final approach segment begins on the final approach course 10 miles from the facility.

3.7.1.4 A procedure turn need not be established when an approach can be made from a properly aligned holding pattern. In such cases, the holding pattern is established over an intermediate fix or a final approach fix. The holding pattern maneuver is completed when the aircraft is established on the inbound course after executing the appropriate entry. If cleared for the approach prior to returning to the holding fix, and the aircraft is at the prescribed altitude, additional circuits of the holding pattern are not necessary nor expected by ATC. If the pilot elects to make additional circuits to lose excessive altitude or to become better established on course, it is his responsibility to so advise ATC when he receives his approach clearance.

3.7.1.5 A procedure turn is not required when an approach can be made directly from a specified intermediate fix to the final approach fix. In such cases, the term "NoPT" is used with the appropriate course and altitude to denote that the procedure turn is not required. If a procedure turn is desired, and when cleared to do so by ATC, descent below the procedure turn altitude should not be made until the aircraft is established on the inbound course, since some NoPT altitudes may be lower than the procedure turn altitudes.

3.7.2 Limitations on Procedure Turns.

3.7.2.1 In the case of a radar initial approach to a final approach fix or position, or a timed approach from a holding fix, or where the procedure specifies "NoPT," no pilot may make a procedure turn unless, when he receives his final approach clearance, he so advises ATC and a clearance is received.

3.7.2.2 When a teardrop procedure turn is depicted and a course reversal is required, this type turn must be executed.

3.7.2.3 When holding pattern replaces the procedure turn, the standard entry and the holding pattern must be followed except when RADAR VECTORING is provided or when NoPT is shown on the approach course. As in the procedure turn, the descent from the minimum holding pattern altitude to the final approach fix altitude (when lower) may not commence until the aircraft is established on the inbound course.

3.7.2.4 The absence of the procedure turn barb in the Plan View indicates that a procedure turn is not authorized for that procedure.

3.8 Side-Step Maneuvers

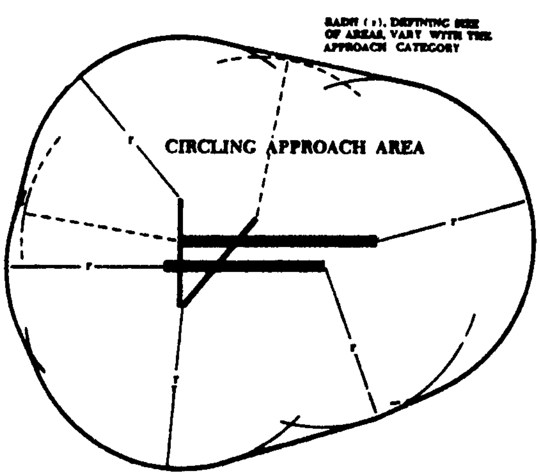
Air Traffic Control may authorize an approach procedure which serves either one of parallel runways that are separated by 1,200 feet or less followed by a straight-in landing on the adjacent runway. Aircraft that will execute a side-step maneuver will be cleared for a specified approach and landing on the adjacent parallel runway. Example, 'cleared ILS runway 7 left approach, side-step to runway 7 right." Pilots are expected to commence the side-step maneuver as soon as possible after the runway or runway environment is in sight. Landing minima to the adjacent runway will be higher than the minima to the primary runway, but will normally be lower than the published circling minimums.

3.9 Approach And Landing Minimums

3.9.1 Landing Minimums. The rules applicable to landing minimums are contained in FAR 91.175.

3.9.2 Published Approach Minimums. Approach minimums are published for different aircraft categories and consist of a minimum altitude (DH, MDA) and required visibility. These minimums are determined by applying the appropriate TERP's criteria. When a fix is incorporated in a nonprecision final segment, two sets of minimums may be published: one, for the pilot that is able to identify the fix, and a second for the pilot that cannot. Two sets of minimums may also be published when a second altimeter source is used in the procedure.

3.9.3 Obstacle Clearance. Final approach obstacle clearance is provided from the start of the final segment to the runway or missed approach point, whichever occurs last. Side-step obstacle protection is provided by increasing the width of the final approach obstacle clearance area. Circling approach protected areas are defined by the tangential connection of arcs drawn from each runway end. The arc radii distance differs by aircraft approach category. Because of obstacles near the airport, a portion of the circling area may be restricted by a procedural note; e.g., "Circling NA E of RWY 17-35." Obstacle clearance is provided at the published minimums for the pilot that makes a straight-in approach, side-steps, circles, or executes the missed approach. Missed approach obstacle clearance requirements may dictate the published minimums for the approach.



CONSTRUCTION OF CIRCLING APPROACH AREA.

CIRCLING APPROACH AREA RADII

Approach Category	*Radius (Miles)*
A	1.3
B	1.5
C	1.7
D	2.3
E	4.5

3.9.4 Straight-In Minimums are shown on the IAP when the final approach course is within 30 degrees of the runway alignment and a normal descent can be made from the IFR altitude shown on the IAP to the runway surface. When either the normal rate of descent or the runway alignment factor of 30 degrees is exceeded, a straight-in minimum is not published and a circling minimum applies. The fact that a straight-in minimum is not published does not preclude pilots from landing straight-in if they have the active runway in sight and have sufficient time to make a normal approach for landing. Under such conditions and when ATC has cleared them for landing on that runway, pilots are not expected to circle even though only circling minimums are published. If they desire to circle, they should advise ATC.

3.9.5 Side-Step Maneuver Minimums. Landing minimums for a side-step maneuver to the adjacent runway will normally be higher than the minimums to the primary runway.

3.9.6 Circling Minimums. In some busy terminal areas, ATC may not allow circling and circling minimums will not be published. Published circling minimums provide obstacle clearance when pilots remain within the appropriate area of protection. Pilots should remain at or above the circling altitude until the aircraft is continuously in a position from which a descent to a landing on the intended runway can be made at a normal rate of descent using normal maneuvers. Circling may require maneuvers at low altitude, at low airspeed, and in marginal weather conditions. Pilots must use sound judgment, have an indepth knowledge of their capabilities, and fully understand the aircraft performance to determine the exact circling maneuver since weather, unique airport design, and the aircraft position, altitude, and airspeed must all be considered. The following basic rules apply:

(1) Maneuver the shortest path to the base or downwind leg, as appropriate, considering existing weather conditions. There is no restriction from passing over the airport or other runways.

(2) It should be recognized that circling maneuvers may be made while VFR or other flying is in progress at the airport. Standard left turns or specific instruction from the controller for maneuvering must be considered when circling to land.

(3) At airports without a control tower, it may be desirable to fly over the airport to observe wind and turn indicators and other traffic which may be on the runway or flying in the vicinity of the airport.

3.9.7 Instrument Approaches At A Military Field. When instrument approaches are conducted by civil aircraft at military airports, they shall be conducted in accordance with the procedures and minimums approved by the military agency having jurisdiction over the airport.

3.10 Instrument Approach Procedures

3.10.1 General

3.10.1.1 FAR 91.175a (Instrument Approaches to Civil Airports) requires the use of standard instrument approach procedures unless otherwise authorized by the Administrator (including ATC). FAR 91.175g (Military Airports) requires civil pilots flying into or out of military airports to comply with the instrument approach procedures and takeoff and landing minimums prescribed by the authority having jurisdiction at those airports.

3.10.1.1.1 All instrument approach procedures (standard and special, civil and military) are based on joint civil/military criteria contained in the U.S. Standard for Terminal Instrument Procedures (TERP's). The design of instrument approach procedures (IAP's) based on criteria contained in TERP's, takes into account the interrelationship between airports, facilities, and the surrounding environment, terrain, obstacles, noise sensitivity, etc. Appropriate altitudes, courses, headings, distances, and other limitations are specified, and once approved, the procedures are published and distributed by government and commercial cartographers as instrument approach charts.

3.10.1.1.2 Not all IAP's are published in chart form. Radar instrument approach procedures are established where requirements and facilities exist but they are printed in tabular form in appropriate U.S. Government Flight Information Publications.

3.10.1.1.3 A pilot adhering to the altitudes, flight paths, and weather minimums depicted on the IAP chart or vectors and altitudes issued by the radar controller, is assured of terrain and obstruction clearance and runway/airport alignment during approach for landing.

3.10.1.1.4 IAP's are designed to provide an IFR descent from the en route environment to a point where a safe landing can be made. They are prescribed and approved by appropriate civil or military authority to ensure a safe descent during instrument flight conditions at a specific airport. It is important that pilots understand these procedures and their use prior to attempting to fly instrument approaches.

3.10.1.1.5 TERP's criteria are provided for the following types of instrument approach procedures:

(1) Precision approaches where an electronic glide slope is provided (PAR and ILS) and,

(2) Nonprecision approaches where glide slope information is not provided (all approaches except PAR and ILS).

3.10.1.2 A limited number of VOR Instrument Approach Procedures, based on a VORTAC facility, have been approved for use by TACAN-equipped aircraft. These procedures are identified by the term "(TAC)" printed adjacent to the name of the procedure; e.g., VOR RWY 3 (TAC). This added information does not change the name of the procedure. It merely tells both pilot and controller that a "VOR RWY 3" instrument approach may be executed by aircraft using TACAN. Air traffic controllers will not refer to the term "TAC" in their air traffic control communications.

3.10.2 Minimums are specified for various aircraft approach categories based upon a value 1.3 times the stalling speed of the aircraft in the landing configuration at maximum certificated gross landing weight. See FAR 97.3(b). If it is necessary, while circling to land, to maneuver at speeds in excess of the upper limit of the speed range for each category, due to the possibility of extending the circling maneuver beyond the area for which obstruction clearance is provided, the circling minimum for the next higher approach category should be used. For example, an aircraft which falls in Category C, but is circling to land at a speed of 141 knots or higher, should use approach category 'D' minimums when circling to land.

3.10.3 When operating on an unpublished route or while being radar vectored, the pilot, when an approach clearance is received, shall, in addition to complying with the minimum altitudes for IFR operations (FAR 91.177), maintain his last assigned altitude (1) unless a different altitude is assigned by ATC, or (2) until the aircraft is established on a segment of a published route or instrument approach procedure. After the aircraft is so established, published altitudes apply to descent within each succeeding route or approach segment unless a different altitude is assigned by ATC. Notwithstanding this pilot responsibility, for aircraft operating on unpublished routes or while being radar vectored, ATC will, except when conducting a radar approach, issue an IFR approach clearance only after the aircraft is (1) established on a segment of a published route or instrument approach procedure, or (2) assigned an altitude to maintain until the aircraft is established on a segment of a published route or instrument approach procedure. For this purpose, the procedure turn of a published IAP shall not be considered a segment of that IAP until the aircraft reaches the initial fix or navigation facility upon which the procedure turn is predicated. Example— "Cross Redding V-O-R at or above five thousand, cleared V-O-R Runway Three Four approach," or "5 miles from outer marker, turn right heading three three zero, maintain two thousand until established on the localizer, cleared I-L-S Runway Three Six approach." The altitude assigned will assure IFR obstruction clearance from the point at which the approach clearance is issued until established on a segment of a published route or instrument approach procedure. If a pilot is uncertain of the meaning of his clearance, he shall immediately request clarification from ATC.

3.10.4 Several instrument approach procedures using various navigation/approach aids may be authorized for an airport. ATC may advise that a particular approach procedure is being used, primarily to expedite traffic. If a pilot is issued a clearance that specifies a particular approach procedure, he is expected to notify ATC immediately if he desires a different one. In this event it may be necessary for ATC to withhold clearance for the different approach until such time as traffic conditions permit. However, if the pilot is involved in an emergency situation he will be given priority. If the pilot is not familiar with the specific approach procedure, ATC should be advised and they will provide detailed information on the execution of the procedure.

3.10.5 At times ATC may not specify a particular approach procedure in the clearance, but will state "CLEARED APPROACH." Such clearance indicates that the pilot may execute any one of the authorized instrument approach procedures for that airport. This clearance does not constitute approval for the pilot to execute a contract approach or a visual approach.

3.10.6 When cleared for a specifically prescribed instrument approach procedure; i.e., "cleared ILS Runway One Niner approach" or when "cleared approach" execution of any procedure prescribed for the airport, pilots shall execute the entire procedure as described on the Instrument Approach Procedure Chart unless an appropriate new or revised ATC clearance is received, or the IFR flight plan is canceled.

3.10.7 Pilots planning flights to locations served by special instrument approach procedures should obtain advance approval from the owner of the procedure. Approval by the owner is necessary because special procedures are for the exclusive use of a single interest unless otherwise authorized by the owner. Additionally, some special approach procedures require certain crew qualifications, training, or other special considerations in order to execute the approach. Also, some of these approach procedures are based on privately owned navigational aids. Owners of aids that are not for public use may elect to turn off the aid for whatever reason they may have; i.e., maintenance, conservation, etc. Air traffic controllers are not required to question pilots to determine if they have permission to use the procedure. Controllers presume a pilot has obtained approval and is aware of any details of the procedure if he files an IFR flight plan to that airport.

3.10.8 When executing an instrument approach and in radio contact with an FAA facility, unless in "radar contact," report passing the final approach fix inbound (non precision approach) or the outer marker or fix used in lieu of the outer marker inbound (precision approach).

3.10.9 If a missed approach is required, advise ATC and include the reason (unless initiated by ATC). Comply with the missed approach instructions for the instrument approach procedure being executed, unless otherwise directed by ATC.

3.10.10 The method used to depict prescribed altitudes on instrument approach charts differs according to techniques employed by different chart publishers. Prescribed altitudes may be depicted in three different configurations: Minimum, maximum, and mandatory. The U.S. Government distributes charts produced by Defense Mapping Agency (DMA) and National Ocean Survey (NOS). Altitudes are depicted on these charts in the profile view with underline, overline, or both to identify them as minimum, maximum, or mandatory.

(1) Minimum Altitude will be depicted with the altitude value underlined. Aircraft are required to maintain altitude at or above the depicted value.

(2) Maximum Altitude will be depicted with the altitude value overscored. Aircraft are required to maintain altitude at or below the depicted value.

(3) Mandatory Altitude will be depicted with the altitude value both underscored and overscored. Aircraft are required to maintain altitude at the depicted value.

Note—The underscore and overscore to identity mandatory altitudes and the overscore to identify maximum altitudes are used almost exclusively by DMA for military charts. With very few exception, civil approach charts produced by NOS utilize only the underscore to identify minimum altitudes. Pilots are cautioned to adhere to altitudes as prescribed because, in certain instances, they may be used as the basis for vertical separation of aircraft by ATC. When a depicted altitude is specified in the ATC clearance, that altitude becomes mandatory as defined above.

3.10.11 Minimum Safe Altitudes (MSA's) are published for emergency use on instrument approach procedure (IAP) charts except RNAV IAPs. The MSA is defined using NDB or VOR type facilities within 25 NM (normally) or 30 NM (maximum) of the airport. The MSA has a 25 NM (normally) or 30 NM (maximum) radius. If there is no NDB or VOR facility within 30 NM of the airport, there will be no MSA. The altitude shown provides at least 1,000 feet of clearance above the highest obstacle in the defined sector. As many as four sectors may be depicted with different altitudes for each sector displayed in rectangular boxes in the plan view of the chart. A single altitude for the entire area may be shown in the lower right portion of the plan view. Navigational course guidance is not assured at the MSA within these sectors.

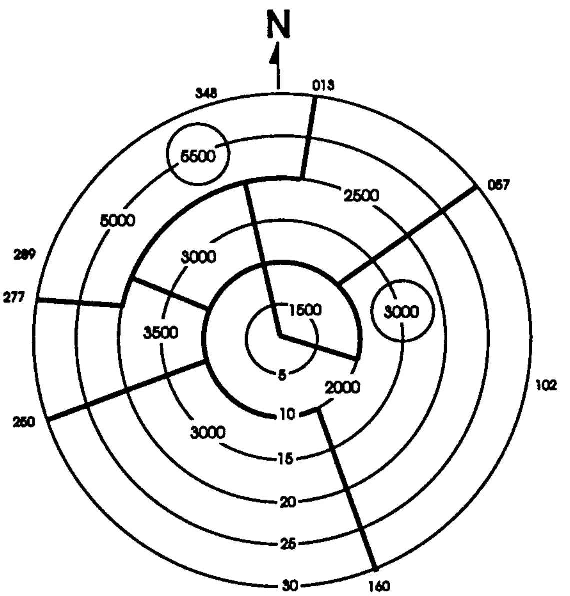
3.10.12 Minimum Vectoring Altitudes (MVA's) are established for use by ATC when radar air traffic control is exercised. MVA charts are prepared by air traffic facilities at locations where there are numerous different minimum IFR altitudes. Each MVA chart has sectors large enough to accommodate vectoring of aircraft within the sector at the MVA. Each sector boundary is at least 3 miles from the obstruction determining the MVA. To avoid a large sector with an excessively high MVA due to an isolated prominent obstruction, the obstruction may be enclosed in a buffer area whose boundaries are at least 3 miles from the obstruction. This is done to facilitate vectoring around the obstruction.

3.10.12.1 The minimum vectoring altitude in each sector provides 1,000 feet above the highest obstacle in non-mountainous areas and 2,000 feet above the highest obstacle in designated mountainous areas. Where lower MVA's are required in designated mountainous areas to achieve compatibility with terminal routes or to permit vectoring to an instrument approach procedure, 1,000 feet of obstacle clearance may be authorized with the use of airport surveillance radar (ASR). The minimum vectoring altitude will provide at least 300 feet above the floor of Class B, C, D and E Airspace.

3.10.12.2 Because of differences in the areas considered for MVA, and those applied to other minimum altitudes, and the ability to isolate specific obstacles, some MVA's may be lower than the nonradar Minimum En route Altitudes (MEA's), Minimum Obstruction Clearance Altitudes (MOCA's), or other minimum altitudes depicted on charts for a given location. While being radar vectored, IFR altitude assignments by ATC will be at or above MVA.

3.10.13 Visual Descent Points (VDP's) are being incorporated in selected nonprecision approach procedures. The VDP is a defined point on the final approach course of a nonprecision straight-in approach procedure from which normal descent from the MDA to the runway touchdown point may be commenced, provided visual reference required by FAR 91.175(c)(3) is established. The VDP will normally be identified by DME on VOR and LOC procedures. The VDP is identified on the profile view of the approach chart by the symbol: V.

3.10.13.1 VDP's are intended to provide additional guidance where they are implemented. No special technique is required to fly a procedure with a VDP. The pilot should not descend below the MDA prior to reaching VDP and acquiring the necessary visual reference.



3.10.13.2 Pilots not equipped to receive the VDP should fly the approach procedure as though no VDP had been provided.

3.11 Radar Approaches

3.11.1 The only airborne radio equipment required for radar approaches is a functioning radio transmitter and receiver. The radar controller vectors the aircraft to align it with the runway centerline. The controller continues the vectors to keep the aircraft on course until the pilot can complete the approach and landing by visual reference to the surface. There are two types of radar approaches "Precision" (PAR) and "Surveillance" (ASR).

3.11.2 A Precision Approach (PAR) is one in which a controller provides highly accurate navigational guidance in azimuth and elevation to a pilot. Pilots are given headings to fly to direct them to and keep their aircraft aligned with the extended centerline of the landing runway. They are told to anticipate glide path interception approximately 10 to 30 seconds before it occurs and when to start descent. The published decision height will be given only if the pilot requests it. If the aircraft is observed to deviate above or below the glide path, the pilot is given the relative amount of deviation by use of terms "slightly" or "well" and is expected to adjust his rate of descent to return to the glide path. Trend information is also issued with respect to the elevation of the aircraft and may be modified by the terms "rapidly" and "slowly;" e.g., "well above glide path, coming down rapidly." Range from touchdown is given at least once each mile. If an aircraft is observed by the controller to proceed outside of specified safety zone limits in azimuth and/or elevation and continues to operate outside these prescribed limits, the pilot will be directed to execute a missed approach or to fly a specified course unless he has the runway environment (runway, approach lights, etc.) in sight. Navigational guidance in azimuth and elevation is provided the pilot until the aircraft reaches the published Decision Height (DH). Advisory course and glidepath information is furnished by the controller until the aircraft passes over the landing threshold, at which point the pilot is advised of any deviation from the runway centerline. Radar service is automatically terminated upon completion of the approach.

3.11.3 A Surveillance Approach is one in which a controller provides navigational guidance in azimuth only. The pilot is furnished headings to fly to align his aircraft with the extended centerline of the landing runway. Since the radar information used for a surveillance approach is considerably less precise than that used for a precision approach, the accuracy of the approach will not be as great, and higher minimums will apply. Guidance in elevation is not possible but the pilot will be advised when to commence descent to the minimum descent altitude (MDA) or, if appropriate, to an intermediate "step down fix" minimum crossing altitude and subsequently to the prescribed MDA. In addition, the pilot will be advised of the location of the missed approach point (MAP) prescribed for the procedure and his position each mile on final from the runway, airport/heliport, or MAP, as appropriate. If requested by the pilot, recommended altitudes will be issued at each mile, based on the descent gradient established for the procedure, down to the last mile that is at or above the MDA. Normally, navigational guidance will be provided until the aircraft reaches the MAP. Controllers will terminate guidance and instruct the pilot to execute a missed approach unless at the MAP the pilot has the runway, airport/heliport in sight or, for a helicopter point-in-space approach, the prescribed visual reference with the surface is established. Also, if at any time during the approach the controller considers that safe guidance for the remainder of the approach can not be provided, he will terminate guidance and instruct the pilot to execute a missed approach. Similarly, guidance termination and missed approach will be effected upon pilot request, and for civil aircraft only, controllers may terminate guidance when the pilot reports the runway, airport/heliport, or visual surface route (point-in-space approach) in sight or otherwise indicates that continued guidance is not required. Radar service is automatically terminated at the completion of a radar approach.

Note. — The published minimum descent altitude (MDA) for straight-in approaches will be issued to the pilot before beginning descent. When a surveillance approach will terminate in a circle to land maneuver, the pilot must furnish the aircraft approach category to the controller. The controller will then provide the pilot with the appropriate MDA.

Note. — ASR approaches are not available when an ATC facility is using Center Radar ARTS Presentation/Processing (CENRAP).

3.11.4 Precision and surveillance approach minimums are published on separate pages in the National Ocean Survey Instrument Approach Procedure charts.

3.11.5 A radar approach may be given to any aircraft upon request and may be offered to pilots of aircraft in distress or to expedite traffic, however, a surveillance approach might not be approved unless there is an ATC operational requirement, or in an unusual or emergency situation. Acceptance of a precision or surveillance approach by a pilot does not waive the prescribed weather minimums for the airport or for the particular aircraft operator concerned. The decision to make a radar approach when the reported weather is below the established minimums rests with the pilot.

3.11.6 A No-Gyro Approach is available to a pilot under radar control who experiences circumstances wherein his directional gyro or other stabilized compass is inoperative or inaccurate. When this occurs, he should so advise air traffic control and request a No-Gyro vector or approach. Pilots of aircraft not equipped with a directional gyro or other stabilized compass who desire radar handling may also request a No-Gyro vector or approach. The pilot should make all turns at standard rate and should execute the turn immediately upon receipt of instructions. For example, "TURN RIGHT," "STOP TURN." When a surveillance or precision approach is made, the pilot will be advised after his aircraft has been turned onto final approach to make turns at half standard rate.

3.12 Radar Monitoring of Instrument Approaches

3.12.1 Precision Approach Radar (PAR) facilities operated by the FAA and the military services at some joint-use (civil/military) and military installations monitor aircraft on instrument approaches and issue radar advisories to the pilot when weather is below VFR minimum (1,000 and 3), at night, or when requested by a pilot. This service is provided only when the PAR final approach course coincides with the final approach of the navigational aid and only during the operational hours of the PAR. The radar advisories serve only as a secondary aid since the pilot has selected the navigational aid as the primary aid for the approach.

3.12.2 Prior to starting final approach, the pilot will be advised of the frequency on which the advisories will be transmitted. If, for any reason, radar advisories cannot be furnished, the pilot will be so advised.

3.12.3 Advisory information, derived from radar observations, includes information on:

(1) Passing the final approach fix inbound (non precision approach) or passing the outer marker or the fix used in lieu of the outer marker inbound (precision approach).

Note—At this point, the pilot may be requested to report sighting the approach lights or the runway.)

(2) Trend advisories with respect to elevation and/or azimuth radar position and movement will be provided.

Note—Whenever the aircraft nears the PAR safety limit, the pilot will be advised that he is well above or below the glidepath or well left or right of course. Glidepath information is given only to those aircraft executing a precision approach, such as ILS or MLS. Altitude information is not transmitted to aircraft executing other than precision approaches because the descent portions of these approaches generally do not coincide with the depicted PAR glidepath. At locations where the MLS glidepath and PAR glidepath are not coincidental, only azimuth monitoring will be provided.

(3) If, after repeated advisories, the aircraft proceeds outside the PAR safety limit or if a radical deviation is observed, the pilot will be advised to execute a missed approach if not visual.

3.12.4 Radar service is automatically terminated upon completion of the approach.

3.13 ILS Approach

3.13.1 Communications should be established with the appropriate FAA control tower or with the FAA flight Service Station, where there is no control tower, prior to starting an ILS approach. This is in order to receive advisory information as to the operation of the facility. It is also recommended that the aural signal of the ILS be monitored during an approach to assure continued reception and receipt of advisory information, when available.

3.13.2 Simultaneous ILS/MLS Approaches

3.13.2.1 System

An approach system permitting simultaneous ILS/MLS, or ILS and MLS approaches to airports having parallel runways separated by at least 4,300 feet between centerlines. Integral parts of a total system are ILS or MLS, radar, communications, ATC procedures, and appropriate airborne equipment. The Approach Procedure Chart permitting simultaneous approaches will contain the note "simultaneous approaches authorized runways 14L and 14R" identifying the appropriate runways as the case may be. When advised that simultaneous ILS approaches are in progress, pilots shall advise approach control immediately of malfunctioning or inoperative receivers or if simultaneous approach is not desired.

Note. — Simultaneous ILS/MLS Approaches are not available when Center Radar ARTS Presentation/Processing (CENRAP) is in use.

3.13.2.2. Radar Monitoring

This service is provided for each ILS/MLS approach to insure prescribed lateral separation during simultaneous ILS/MLS approaches. Radar Monitoring includes instructions when an aircraft nears or exceeds the prescribed no transgression zone (an area at least 2,000 feet wide). This service will be provided as follows:

(1) The monitor controller will have the capability of overriding the tower controller on the tower frequency.

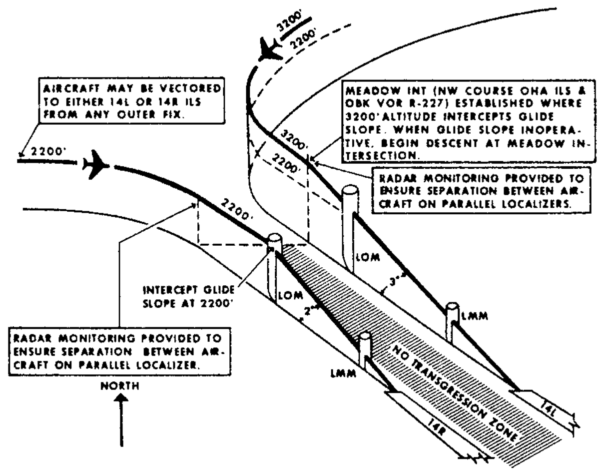
(2) Pilots will be advised to monitor the tower frequency to receive advisories and instructions.

(3) Aircraft deviating from either final approach course to the point where the no transgression zone (an area at least 2,000 feet wide) may be penetrated will be instructed to take corrective action. If an aircraft fails to respond to such instruction, the aircraft on the adjacent final approach course may be instructed to alter course.

(4) The monitor will automatically be terminated no more than one mile from the runway threshold.

(5) The monitor controller will *not* advise when the monitor is terminated.

3.13.2.3 Simultaneous ILS Approach Graphic



3.13.3 Parallel ILS/MLS Approaches

3.13.3.1 Parallel approaches are an air traffic control procedure permitting parallel ILS, MLS, or ILS and MLS approaches to airports having parallel runways separated by at least 2,500 feet between centerlines. Integral parts of a total system are ILS or MLS, radar, communications, ATC procedures, and appropriate airborne equipment.

3.13.3.2 A parallel approach differs from a simultaneous approach in that the minimum distance between parallel runway centerlines is reduced; there is no requirement for radar monitoring or advisories; and, a staggered separation of aircraft on the adjacent localizer course is required.

3.13.3.3 Aircraft are afforded a minimum of 2 miles radar separation between successive aircraft on the adjacent localizer course and a minimum of 3 miles radar separation from aircraft on the same localizer course. In addition, a minimum of 1,000 feet vertical or a minimum of 3 miles radar separation is provided between aircraft during turn-on.

3.13.3.4 Whenever parallel approaches are in progress, aircraft are informed that approaches to both runways are in use. In addition, the radar controller will have the interphone capability of communicating directly with the tower controller where the responsibility for radar separation is not performed by the tower controller.

3.13.4 Simultaneous Converging Instrument Approaches

3.13.4.1 ATC may conduct instrument approaches simultaneously to converging runways; i.e., runways having an included angle from 15 to 100 degrees, at airports where a program has been specifically approved to do so.

3.13.4.2 The basic concept requires that dedicated, separate standard instrument approach procedures be developed for each converging runway included. Missed approach points must be as least 3 miles apart and missed approach procedures ensure that missed approach protected airspace does not overlap.

3.13.4.3 Other requirements are: radar availability, nonintersecting final approach courses, precision (ILS/MLS) approach systems on each runway, and if runways intersect, controllers must be able to apply visual separation as well as intersecting runway separation criteria. Intersecting runways also require minimums of at least 700 and 2. Straight in approaches and landings must be made.

3.13.4.4 Whenever simultaneous converging approaches are in progress, aircraft will be informed by the controller as soon as feasible after initial contact or via ATIS. Additionally, the radar controller will have direct communications capability with the tower controller where separation responsibility has not been delegated to the tower.

3.14 Timed Approaches From a Holding Fix

3.14.1 Timed approaches may be conducted when the following conditions are met:

(1) A control tower is in operation at the airport where the approaches are conducted.

(2) Direct communications is maintained between the pilot and the center/approach controller until the pilot is instructed to contact the tower.

(3) If more than one missed approach procedure is available, none require a course reversal.

(4) If only one missed approach procedure is available, the following conditions are met:

(a) Course reversal is not required; and,

(b) Reported ceiling and visibility are equal to or greater than the highest prescribed circling minimums for the instrument approach procedure.

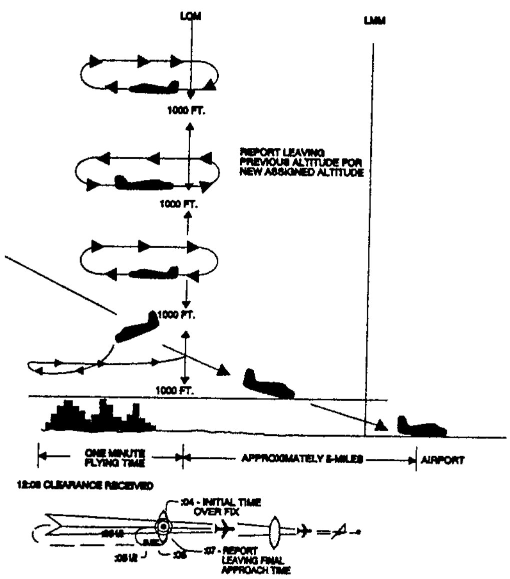
(5) When cleared for the approach, pilots shall not execute a procedure turn. (Ref: FAR 91.175j)

3.14.2 Although the controller will not specifically state that "timed approaches are in progress," his assigning a time to depart the final approach fix inbound (non-precision approach) or the outer marker or the fix used in lieu of the outer marker inbound (precision approach) is indicative that timed approach procedures are being utilized, or in lieu of holding, he may use radar vectors to the final approach course to establish a mileage interval between aircraft that will insure the appropriate time sequence between the final approach fix/outer marker or the fix used in lieu of the outer marker and the airport.

3.14.3 Each pilot in an approach sequence will be given advance notice as to the time he should leave the holding point on approach to the airport. When a time to leave the holding point has been received, the pilot should adjust his flight path to leave the fix as closely as possible to the designated time.

3.14.4 Timed Approach Example

The following figure depicts a final approach procedure from a holding pattern at a final approach fix (FAF). At 12:03 local time, in the example shown, a pilot holding, receives instructions to leave the fix inbound at 12:07. These instructions are received just as the pilot has completed turn at the outbound end of the holding pattern and is proceeding inbound towards the fix. Arriving back over the fix, the pilot notes that the time is 12:04 and that he has three minutes to lose in order to leave the fix at the assigned time. Since the time remaining is more than two minutes, the pilot plans to fly a race track pattern rather than a 360° turn, which would use up two minutes. The turns at the ends of the race track pattern will consume approximately two minutes. Three minutes to go, minus two minutes required for turns, leaves one minute for level flight. Since two portions of level flight will be required to get back to the fix inbound, the pilot halves the one minute remaining and plans to fly level for 30 seconds outbound before starting his turn back toward the fix on final approach. If the winds were negligible at flight altitude, this procedure would bring the pilot inbound across the fix precisely at the specified time of 12:07. However, if the pilot expected a headwind on final approach, he should shorten his 30 seconds outbound course somewhat, knowing that the wind will carry him away from the fix faster while outbound and decrease his ground speed while returning to the fix. On the other hand, if the pilot knew he would have a tailwind on final approach, should length his calculated 30-second outbound heading somewhat, knowing the wind would tend to hold him closer to the fix while outbound and increase his ground speed while returning to the fix.



3.15 Contact Approaches

3.15.1 Pilots operating in accordance with an IFR flight plan, provided they are clear of clouds and have at least 1 mile flight visibility and can reasonably expect to continue to the destination airport in those conditions, may request ATC authorization for a "contact approach."

3.15.2 Controllers may authorize a "contact approach" provided:

(1) The Contact Approach is specifically requested by the pilot. ATC cannot initiate this approach.

Example:

REQUEST CONTACT APPROACH

(2) The reported ground visibility at the destination airport is at least 1 statute mile.

(3) The contact approach will be made to an airport having a standard or special instrument approach procedure.

(4) Approved separation is applied between aircraft so cleared and between these aircraft and other IFR or special VFR aircraft.

Example:

CLEARED CONTACT APPROACH (and if required) AT OR BELOW (altitude) (routing) IF NOT POSSIBLE (alternative procedures) AND ADVISE.

3.15.3 A Contact Approach is an approach procedure that may be used by a pilot (with prior authorization from ATC) in lieu of conducting a standard or special instrument approach procedure to an airport. It is not intended for use by a pilot on an IFR flight clearance to operate to an airport not having an authorized instrument approach procedure. Nor is it intended for an aircraft to conduct an instrument approach to one airport and then, when "in the clear," to discontinue that approach and proceed to another airport. In the execution of a contact approach, the pilot assumes the responsibility for obstruction clearance. If radar service is received, it will automatically terminate when the pilot is told to contact the tower.

3.16 Visual Approaches

3.16.1 When it will be operationally beneficial, ATC may authorize an aircraft to conduct a "visual approach" to an airport or to follow another aircraft when flight to and landing at the airport can be accomplished in VFR weather. The aircraft must have the airport or the identified preceding aircraft in sight before the clearance is issued. If the aircraft has the airport in sight but cannot see the aircraft he is following, ATC may still clear the aircraft for a visual approach; however, ATC retains both separation and wake vortex separation responsibility. When visually following a preceding aircraft, acceptance of a visual approach clearance, constitutes acceptance of a responsibility for maintaining a safe approach interval and adequate wake turbulence separation.

3.16.2 When operating to an airport with an operating control tower, aircraft may be authorized to conduct a "visual approach" to one runway while other aircraft are conducting IFR or VFR approaches to another parallel, intersecting, or converging runway. When operating to airports with parallel runways separated by less than 2,500 feet, the succeeding aircraft must report sighting the preceding aircraft unless standard separation is being provided by ATC. When operating to parallel runways separated by at least 2,500 feet but less than 4,300 feet, controllers will clear/vector aircraft to the final at an angle not greater than 30-degrees unless radar, vertical, or visual separation is provided during the turn-on. The purpose of the 30-degree intercept angle is to reduce the potential for overshoots of the final and to preclude side-by-side operations with one or both aircraft in a "belly-up" configuration during the turn-on. Once the aircraft are established within 30-degrees of final, or on the final, these operations may be conducted simultaneously. When the parallel runways are separated by 4,300 feet or more, or intersecting/converging runways are in use, ATC may authorize a visual approach after advising all aircraft involved that other aircraft are conducting operations to the other runway. This may be accomplished through use of the ATIS.

3.16.3 When operating to an airport without weather reporting service, ATC may initiate a visual approach provided area weather reports indicate that VFR conditions exist at the airport and there is reasonable assurance that descent and flight to the airport can be made in VFR conditions. Pilot acceptance if a visual approach clearance or a pilot's request for a visual approach will indicate to ATC that the pilot can comply with FAR 91.155. ATC will advise the pilot when weather is not available at the destination airport.

3.16.4 Authorization to conduct a "visual approach" is an IFR authorization and does not alter IFR flight plan cancellation responsibility. (See RAC-3.1; 5.2 CANCELING IFR FLIGHT PLAN.)

3.16.5 A visual approach is not an instrument approach procedure and therefore has no missed approach segment. If a go around is necessary for any reason, aircraft operating at controlled airports will be issued an appropriate advisory/clearance/instruction by the tower. At uncontrolled airports, aircraft are expected to remain in VFR conditions and complete a landing as soon as possible. If a landing cannot be accomplished, the aircraft is expected to remain in VFR conditions and contact ATC as soon as possible for further clearance. Separation from other IFR aircraft will be maintained under these circumstances.

3.16.6 Visual approaches are initiated by ATC to reduce pilot/controller workload and expedite traffic by shortening flight paths to the airport. It is the pilot's responsibility to advise ATC as soon as possible if a visual approach is not desired.

3.16.7 Radar service is automatically terminated, without advising the pilot, when the aircraft is instructed to change to advisory frequency.

3.17 Charted Visual Flight Procedures (CVFP's)

3.17.1 CVFP's are charted visual approaches established at locations with jet operations for noise abatement purposes. The approach charts depict prominent landmarks, courses, and recommended altitudes to specific runways.

3.17.2 These procedures will be used only in a radar environment at airports with an operating control tower.

3.17.3 Most approach charts will depict some NAVAID information which is for supplemental navigational guidance only.

3.17.4 Unless indicating a Class B Airspace floor, all depicted altitudes are for noise abatement purposes and are recommended only. Pilots are not prohibited from flying other than recommended altitudes if operational requirements dictate.

3.17.5 When landmarks used for navigation are not visible at night, the approach will be annotated "PROCEDURE NOT AUTHORIZED AT NIGHT."

3.17.6 CVFP's usually begin within 15 flying miles from the airport.

3.17.7 Published weather minimums for CVFP's are based on minimum vectoring altitudes rather than the recommended altitudes depicted on charts.

3.17.8 CVFP's are not instrument approaches and do not have missed approach segments.

3.17.9 ATC will not issue clearances for CVFP's when the weather is less than the published minimum.

3.17.10 ATC will clear aircraft for a CVFP after the pilot reports siting a charted landmark or a preceding aircraft. If instructed to follow a preceding aircraft, pilots are responsible for maintaining a safe approach interval and wake turbulence separation.

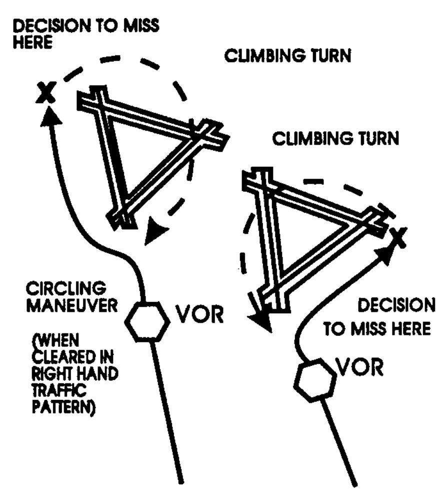
3.17.11 Pilots should advise ATC if at any point they are unable to continue an approach or lose sight of a preceding aircraft. Missed approaches will be handled as a go-around.

3.18 Missed Approach

3.18.1 When a landing cannot be accomplished, advise ATC and, upon reaching the missed approach point defined on the approach procedure chart, the pilot must comply with the missed approach instructions for the procedure being used or with an alternate missed approach procedure specified by Air Traffic Control.

3.18.2 Protected obstacle clearance areas for missed approach are predicated on the assumption that the abort is initiated at the missed approach point not lower than the Minimum Descent Altitude (MDA) or Decision Height maneuvers. However, no consideration is given to an abnormally early turn. Therefore, when an early missed approach is executed, pilots should, unless otherwise cleared by ATC, fly the instrument approach procedure as specified on the approach plate to the missed approach point at or above the MDA or DH before executing a turning maneuver.

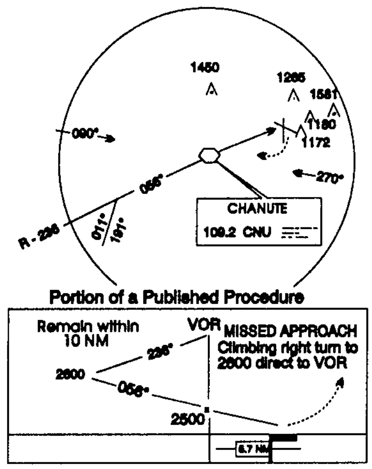
3.18.3 If visual reference is lost while circling to land from an instrument approach, the missed approach specified for that particular procedure must be followed (unless an alternate missed approach procedure is specified by Air Traffic control). To become established on the prescribed missed approach course, the pilot should make an initial climbing turn toward the landing runway and continue the turn until he is established on the missed approach course. Inasmuch as the circling maneuver may be accomplished in more than one direction, different patters will be required to become established on the prescribed missed approach course depending on the aircraft position at the time visual reference is lost. Adherence to the procedure, illustrated below, will assure that an aircraft will remain within the circling and missed approach obstruction clearance areas.



ILLUSTRATION

3.18.4 At locations where ATC Radar Service is provided the pilot should conform to radar vectors when provided by ATC in lieu of the published missed approach procedure.

3.18.5 Missed Approach Procedure Example



3.18.6 When the approach has been missed, request a clearance for specific action; i.e., to alternative airport, another approach, etc.

3.19 Overhead Approach Maneuver

3.19.1 Pilots operating in accordance with an instrument flight rules (IFR) flight plan in visual meteorological conditions (VMC) may request Air Traffic Control (ATC) authorization for an overhead maneuver. An overhead maneuver is not an instrument approach procedure. Overhead maneuver patterns are developed at airports where aircraft have an operational need to conduct the maneuver. An aircraft conducting an overhead maneuver is considered to be visual flight rules (VFR) and the IFR flight plan is cancelled when the aircraft crosses the landing threshold on the initial approach portion of the maneuver. The existence of a standard overhead maneuver pattern does not eliminate the possible requirement for an aircraft to conform to conventional rectangular patterns if an overhead maneuver cannot be approved. Aircraft operating to an airport without a functioning control tower must initiate cancellation of an IFR flight plan prior to executing the overhead maneuver. Cancellation of the IFR flight plan must be accomplished after crossing the landing threshold on the initial portion of the maneuver or after landing. Controllers may authorize an overhead maneuver and issue the following to arriving aircraft:

3.19.1.1 Pattern altitude and direction of traffic. This information may be omitted if either is standard.

PHRASEOLOGY:

PATTERN ALTITUDE (altitude). RIGHT TURNS.

3.19.1.2 Request for a report on initial approach.

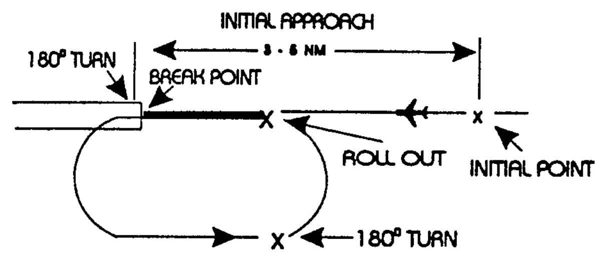
PHRASEOLOGY:

REPORT INITIAL.

3.19.1.3 "Break" information and a request for the pilot to report. The "Break Point" will be specified if non-standard. Pilots may be requested to report "break" if required for traffic or other reasons.

PHRASEOLOGY:

BREAK AT (Specified point).
REPORT BREAK.



4. DEPARTURE PROCEDURES

4.1 Pre-Taxi Clearance Procedures

4.1.1 Certain airports have established programs whereby pilots of departing IFR aircraft may elect to receive their IFR clearances before they start taxiing for takeoff. The following provisions are included in such procedures:

(1) Pilot participation is not mandatory.

(2) Participating pilots call clearance delivery/ground control not more than 10 minutes before proposed taxi time.

(3) IFR clearance (or delay information, if clearance cannot be obtained) is issued at the time of this initial call-up.

(4) When the IFR clearance is received on clearance delivery frequency, pilots call ground control when ready to taxi.

(5) Normally, pilots need not inform ground control that they have received IFR clearance on clearance delivery frequency. Certain locations may, however, require that the pilot inform ground control of a portion of his routing or that he has received his IFR clearance.

(6) If a pilot cannot establish contact on clearance delivery frequency or has not received his IFR clearance before he is ready to taxi, he contacts ground control and informs the controller accordingly.

4.1.2 Locations where these procedures are in effect are indicated in the Airport/Facility Directory.

4.2 Taxi Clearance

Pilots on IFR flight plans should communicate with the control tower on the appropriate ground control/clearance delivery frequency prior to starting engines to receive engine start time, taxi, and/or clearance information.

4.3 Departure Restrictions, Clearance Void Times, Hold for Release, and Release Times

4.3.1 ATC may assign departure restrictions, clearance void times, hold for release, and release times, when necessary, to separate departures from other traffic or to restrict or regulate the departure flow.

4.3.1.1 Clearance Void Times—A pilot may receive a clearance, when operating from an airport without a control tower, which contains a provision for the clearance to be void if not airborne by a specific time. A pilot who does not depart prior to the clearance void time must advise ATC as soon as possible of his or her intentions. ATC will normally advise the pilot of the time allotted to notify ATC that the aircraft did not depart prior to the clearance void time. This time cannot exceed 30 minutes. Failure of an aircraft to contact ATC within 30 minutes after the clearance void time will result in the aircraft being considered overdue and search and rescue procedures initiated.

NOTE 1.-Other IFR traffic for the airport where the clearance is issued is suspended until the aircraft has contacted ATC or until 30 minutes after the clearance void time or 30 minutes after the clearance release time if no clearance void time is issued.

NOTE 2.—Pilots who depart at or after their clearance void time are not afforded IFR separation and may be in violation of FAR 91.173 which requires that pilots receive an appropriate ATC clearance before operating IFR in Class A, B, C, D and E Airspace.

EXAMPLE:

CLEARANCE VOID IF NOT OFF BY (clearance void time) and, if required, IF NOT OFF BY (clearance void time) ADVISE (facility) NOT LATER THAN (time) OF INTENTIONS.

4.3.1.2 Hold for Release—ATC may issue "hold for release" instructions in a clearance to delay an aircraft's departure for traffic management reasons (i.e., weather, traffic volume, etc.). When ATC states in the clearance, "hold for release," the pilot may not depart utilizing that instrument flight rules (IFR) clearance until a release time or additional instructions are issued by ATC. This does not preclude the pilot from departing visual flight rules (VFR); but an IFR clearance may not be available after departure. In addition, ATC will include departure delay information in conjunction with "hold for release" instructions.

EXAMPLE:

(Aircraft identification) CLEARED TO (destination) AIRPORT AS FILED, MAINTAIN (altitude), and, if required (additional instructions or information), HOLD FOR RELEASE, EXPECT (time in hours and/or minutes) DEPARTURE DELAY.

4.3.1.3 Release Times—A "release time" is a departure restriction issued to a pilot by ATC, specifying the earliest time an aircraft may depart. ATC will use "release times" in conjunction with traffic management procedures and/or to separate a departing aircraft from other traffic.

EXAMPLE:

(Aircraft identification) RELEASED FOR DEPARTURE AT (time in hours and/or minutes).

4.4 Departure Control

4.4.1 Departure Control is an approach control function responsible for ensuring separation between departures. So as to expedite the handling of departures, Departure Control may suggest a takeoff direction other than that which may normally have been used under VFR handling. Many times it is preferred to offer the pilot a runway that will require the fewest turns after takeoff to place the pilot on his filed course or selected departure route as quickly as possible. At many locations particular attention is paid to the use of preferential runways for local noise abatement programs, and route departures away from congested areas.

4.4.2 Departure Control utilizing radar will normally clear aircraft out of the terminal area using standard instrument departures (SID) via radio navigation aids. When a departure is to be vectored immediately following takeoff, the pilot will be advised prior to takeoff of the initial heading to be flown but may not be advised of the purpose of the heading. Pilots operating in a radar environment are expected to associate departure headings with vectors to their planned route of flight. When given a vector taking his aircraft off a previously assigned nonradar route, the pilot will be advised briefly what the vector is to achieve. Thereafter, radar service will be provided until the aircraft has been reestablished "on-course" using an appropriate navigation aid and the pilot has been advised of his position; or, a handoff is made to another radar controller with further surveillance capabilities.

4.4.3 Controllers will inform pilots of the departure control frequencies and, if appropriate, the transponder code before takeoff. Pilots should not operate their transponder until ready to start the takeoff roll or change to the departure control frequency until requested. Controllers may omit the departure control frequency if a SID has or will be assigned and the departure control frequency is published on the SID.

4.5 Abbreviated IFR Departure Clearance (Cleared . . . as Filed) Procedures

4.5.1 ATC facilities will issue an abbreviated IFR departure clearance based on the ROUTE of flight filed in the IFR flight plan, provided the filed route can be approved with little or no revision. These abbreviated clearance procedures are based on the following conditions:

(1) The aircraft is on the ground or it has departed VFR and the pilot is requesting IFR clearance while airborne.

(2) That a pilot will not accept an abbreviated clearance if the route or destination of a flight plan filed with ATC has been changed by him or the company or the operations officer before departure.

(3) That it is the responsibility of the company or operations office to inform the pilot when they make a change to the filed flight plan.

(4) That it is the responsibility of the pilot to inform ATC in his initial call-up (for clearance) when the filed flight plan has been (a) amended or (b) canceled and replaced with a new filed flight plan.

Note—The facility issuing a clearance may not have received the revised route or the revised flight plan by the time a pilot requests clearance.

4.5.2 The controller will issue a detailed clearance when he knows that the original filed flight plan has been changed or when the pilot requests a full route clearance.

4.5.3 The clearance as issued will include the destination airport filed in the flight plan.

4.5.4 ATC procedures now require the controller to state the Standard Instrument Departure (SID) name, the current number and the SID Transition name after the phrase "Cleared to (destination) airport," and prior to the phrase, "then as filed," for ALL departure clearances when the SID or SID Transition is to be flown. The procedure applies whether or not the SID is filed in the flight plan.

4.5.5 Standard Terminal Arrivals (STAR's), when filed in a flight plan, are considered a part of the filed route of flight and will not normally be stated in an initial departure clearance. If the ARTCC's jurisdictional airspace includes both the departure airport and the fix where a STAR or STAR Transition begins, the STAR name, the current number, and the STAR Transition name MAY be stated in the initial clearance.

4.5.6 "Cleared to (destination) airport as filed" does NOT include the en route altitude filed in a flight plan. An en route altitude will be stated in the clearance or the pilot will be advised to expect an assigned/filed altitude within a given time frame or at a certain point after departure. This may be done verbally in the departure instructions or stated in the SID.

4.5.7 In a radar and a nonradar environment, the controller will state "Cleared to (destination) airport as filed" or:

(1) If a SID or SID Transition is to be flown, specify the SID name, the current SID number, the SID Transition name, the assigned altitude/flight level, and any additional instructions (departure control frequency, beacon code assignment, etc.) necessary to clear a departing aircraft via the SID/SID Transition and the route filed.

Example:

NATIONAL SEVEN TWENTY CLEARED TO MIAMI AIRPORT, INTERCONTINENTAL ONE DEPARTURE, LAKE CHARLES TRANSITION, THEN AS FILED MAINTAIN FLIGHT LEVEL TWO SEVEN ZERO.

(2) When there is no SID or when the pilot cannot accept a SID, specify the assigned altitude/flight level, and any additional instructions necessary to clear a departing aircraft via an appropriate departure routing and the route filed.

Note—A detailed departure route description or a radar vector may be used to achieve the desired departure routing.

(3) If necessary to make a minor revision to the filed route, specify the assigned SID/SID Transition (or departure routing), the revision to the filed route, the assigned altitude/flight level and any additional instructions necessary to clear a departing aircraft.

Example:

JET STAR ONE FOUR TWO FOUR CLEARED TO ATLANTA AIRPORT, SOUTH BOSTON TWO DEPARTURE, THEN AS FILED, EXCEPT CHANGE ROUTE TO READ, SOUTH BOSTON VICTOR 20 GREENSBORO, MAINTAIN ONE SEVEN THOUSAND.

(4) Additionally, in a nonradar environment, specify one or more fixes as necessary to identify the initial route of flight.

Example:

CESSNA THREE ONE SIX FOXTROT CLEARED TO CHARLOTTE AIRPORT AS FILED VIA BROOKE, MAINTAIN SEVEN THOUSAND.

4.5.8 To ensure success of the program, pilots should:

(1) Avoid making changes to a filed flight plan just prior to departure.

(2) State the following information in the initial call-up to the facility when no change has been made to the filed flight plan: Aircraft call sign, location, type operation (IFR) and the name of the airport (or fix) to which you expect clearance.

Example:

"WASHINGTON CLEARANCE DELIVERY (or Ground Control if appropriate) AMERICAN SEVENTY SIX AT GATE ONE, I-F-R LOS ANGELES."

If the flight plan has been changed, state the change and request a full route clearance.

Example:

"WASHINGTON CLEARANCE DELIVERY, AMERICAN SEVENTY SIX AT GATE ONE I-F-R SAN FRANCISCO. MY FLIGHT PLAN ROUTE HAS BEEN AMENDED (or destination changed), REQUEST FULL ROUTE CLEARANCE."

(3) Request verification or clarification from ATC if ANY portion of the clearance is not clearly understood.

(4) When requesting clearance for the IFR portion of a VFR-IFR flight, request such clearance prior to the fix where IFR operation is proposed to commence in sufficient time to avoid delay. Use the following phraseology:

Example:

"LOS ANGELES CENTER, APACHE SIX ONE PAPA, V-F-R, ESTIMATING PASO ROBLES V-O-R AT THREE TWO, ONE THOUSAND FIVE HUNDRED, REQUEST I-F-R TO BAKERSFIELD."

4.6 Instrument Departures

4.6.1 Standard Instrument Departures (SID's)

4.6.1.1 A Standard Instrument Departure (SID) is an air traffic control coded departure procedure which has been established at certain airports to simplify clearance delivery procedures.

4.6.1.2 Pilots of civil aircraft operating from locations where SID procedures are effective may expect ATC clearances containing a SID. Use of a SID requires pilot possession of at least the textual description of the approved effective SID. Controllers may omit the departure control frequency if a SID clearance is issued and the departure control frequency is published on the SID. If the pilot dose not possess a charted SID or preprinted SID description or for any other reason does not wish to use a SID, he is expected to advise ATC. Notification may be accomplished by filing "NO SID" in the remarks section of the filed flight plan or by the less desirable method of verbally advising ATC.

4.6.1.3 All effective SID's are published in textual and graphic form by the National Ocean Survey in the *Terminal Procedures Publication (TPP).*

4.6.1.4 SID procedures will be depicted in one of two basic forms.

(1) Pilot Navigation (Pilot NAV) SID's are established where the pilot is primarily responsible for navigation on the SID route. They are established for airports when terrain and safety related factors indicate the necessity for a pilot NAV SID. Some pilot NAV SID's may contain vector instructions which pilots are expected to comply with until instructions are received to resume normal navigation on the filed/assigned route or SID procedure.

(2) Vector SID's are established where ATC will provide radar navigational guidance to a filed/assigned route or to a fix depicted on the SID.

4.6.2 Obstruction Clearance During Departure

4.6.2.1 Published instrument departure procedures and SID's assist pilots conducting IFR flight in avoiding obstacles during climbout to minimum en route altitude (MEA). These procedures are established only at locations where instrument approach procedures are published. Standard instrument takeoff minimums and departure procedures are prescribed in FAR 91.175. Airports with takeoff minimums other than standard (one statute mile for aircraft having two engines or less and one-half statute mile for aircraft having more than two engines) are described in airport listings on separate pages titled IFR TAKE-

OFF MINIMUMS AND DEPARTURE PROCEDURES, at the front of each U.S. Government published IAP and SID book. The approach chart and SID chart for each airport where takeoff minimums are not standard and/or departure procedures are published is annotated with a special symbol ▼. The use of this symbol indicates that the separate listing should be consulted. These minimums also apply to SID's unless the SID's specify different minimums.

4.6.2.2 Obstacle clearance is based on the aircraft climbing at least 200 feet per nautical mile, crossing the end of the runway at least 35 feet AGL, and climbing to 400 feet above airport elevation before turning, unless otherwise specified in the procedure. A slope of 152 feet per nautical mile, starting no higher than 35 feet above the departure end of the runway, is assessed for obstacles. A minimum obstacle clearance of 48 feet per nautical mile is provided in the assumed climb gradient.

(1) If no obstacles penetrate the 152 feet per nautical mile slope, IFR departure procedures are not published.

(2) If obstacles do penetrate the slope, avoidance procedures are specified. These procedures may be: a ceiling and visibility to allow the obstacles to be seen and avoided; a climb gradient greater than 200 feet per nautical mile; detailed flight maneuvers; or a combination of the above. In extreme cases, IFR takeoff may not be authorized for some runways.

Example:

Rwy 17, 300-1 or standard with minimum climb of 220 feet per NM to 1,100.

4.6.2.3 Climb gradients are specified when required for obstacle clearance. Crossing restrictions in the SID's may be established for traffic separation or obstacle clearance. When no gradient is specified, the pilot is expected to climb at least 200 feet per nautical mile to MEA unless required to level off by a crossing restriction.

Example:

"CROSS ALPHA INTERSECTION AT OR BELOW FOUR THOUSAND; MAINTAIN SIX THOUSAND." The pilot climbs at least 200 feet per nautical mile to 6,000. If 4,000 is reached before ALPHA, the pilot levels off at 4,000 until passing ALPHA; then immediately resumes at least 200 feet per nautical mile climb.

4.6.2.4 Climb gradients may be specified to an altitude/fix, above which the normal gradient applies.

Example:

"MINIMUM CLIMB 340 FEET PER NM TO 2,700." The pilot climbs at least 340 feet per nautical mile to 2,700, then at least 200 feet per NM to MEA.

4.6.2.5 Some IFR departure procedures require a climb in visual conditions to cross the airport (or an on-airport NAVAID) in a specified direction, at or above a specified altitude.

Example:

"CLIMB IN VISUAL CONDITIONS SO AS TO CROSS THE McELORY AIRPORT SOUTHBOUND AT OR ABOVE SIX THOUSAND, THEN CLIMB VIA KEEMMLING R-033 TO KEEMMLING VOR-TAC."

(1) When climbing in visual conditions it is the pilot's responsibility to see and avoid obstacles. Specified ceiling and visibility minimums will allow visual avoidance of obstacles until the pilot enters the standard obstacle protection area. Obstacle avoidance is not guaranteed if the pilot maneuvers farther from the airport than the visibility minimum.

(2) That segment of the procedure which requires the pilot to see and avoid obstacles ends when the aircraft crosses the specified point at the required altitude. Thereafter, standard obstacle protection is provided.

4.6.2.6 Each pilot, prior to departing an airport on an IFR flight, should consider the type of terrain and other obstacles on or in the vicinity of the departure airport and:

(1) Determine whether a departure procedure and/or SID is available for obstacle avoidance.

(2) Determine if obstacle avoidance can be maintained visually or that the departure procedure or SID should be followed.

(3) Determine what action will be necessary and take such action that will assure a safe departure.

Note—The term *Radar Contact,* when used by the controller during departure, should not be interpreted as relieving pilots of their responsibility to maintain appropriate terrain and obstruction clearance.

Terrain/obstruction clearance is not provided by ATC until the controller begins to provide navigational guidance; i.e., radar vectors.

BIRD HAZARDS, AND FLIGHT OVER NATIONAL REFUGES, PARKS, AND FORESTS

1. MIGRATORY BIRD ACTIVITY

1.1 Bird strike risk increases because of bird migration during the months of March through April and August through November.

1.2 The altitudes of migrating birds vary with winds aloft, weather fronts, terrain elevations, cloud conditions, and other environmental variables. WHile over 90 percent of the reported bird strikes occur at or below 3,000 feet AGL, strikes at higher altitudes are common during migration. Ducks and geese are frequenty observed uo to 7,000 feet AGL and pilots are cautioned to minimize en route flying at lower altitudes during migration.

1.3 Considered the greatest potential hazard to aircraft because of their size, abundance, or habit of flying in dense flocks are gulls, waterfowl, vultures, hawks, owls, egrets, blackbirds and starlings. Four major migratory flyways exist in the United States. The Atlantic Flyway parallels the Atlantic coast, the Mississippi Flyway stretches from Canada through the Great Lakes and follows the Mississippi River. The Central Flyway represnets a broad area east of the Rockies, stretching from Canada through Central America. The Pacific Flyway follows the west coast and overflies major parts of Washington, Oregon, and California. There are also numerous smaller flyways which cross these major north-south migratory routes.

2. REDUCING BIRD STRIKE RISKS

2.1 The most serious strikes are those involving ingestion into an engine (turboprop and turbine jet engines) or windshield strikes. These strikes can result in emergency situations requiring prompt action by the pilot.

2.2 Engine ingestions may result in sudden loss of power or engine failure. Review engine out procedures, especially when operating from airports with known bird hazards or wwhen operating near high bird concentrations.

2.3 Windshield strikes have resulted in pilots experiencing confusion, disorientation, loss of communications, and aircraft control problems. Pilots are encouraged to review their emergency procedures before flying in these areas.

2.4 When encountering birds en route, climb to avoid collision because birds in flocks generally distribute themselves downward, with lead birds being at the highest altitude.

2.5 Avoid overflight of known areas of bird concentration and flying low altitudes during bird migration. Charted wildlife refuges and other natural areas contain unusually high local concentration of birds which may create a hazard to aircraft.

3. REPORTING BIRD STRIKES

Pilots are urged to report any bird or other wildlife strike using FAA Form 5200-7, Bird Strike Incident/Ingestion Report. Forms are available at any FSS, General Aviation District Office, Air Carrier District Office, or at an FAA Regional Office. The data derived from these reports is used to develop standards to cope with this potential hazard to aircraft and for documentation of necessary habitat control on airports.

4. REPORTING BIRD AND OTHER WILDLIFE ACTIVITIES

If you observe birds or other animals on or near the runway, request airport management to disperse the wildlife before taking off. Also contact the nearest FAA ARTCC, FSS, or tower (including non-Federal towers) regarding large flocks of birds and report the:

a. Geographic location

b. Bird type (geese, ducks, gulls, etc.)

c. Approximate numbers

d. Altitude

e. Direction of bird flight path

5. PILOT ADVISORIES ON BIRD AND OTHER WILDLIFE HAZARDS

Many airports advise pilots of other wildlife hazards caused by large animals on the runway through the Airport/Facility Directory and the NOTAM system. Collisions between landing and departing aircraft with animals on the runway are increasing and are not limited to rural airports. These accidents have also occurred at several major airports. Pilots should exercise extreme caution when arned of the presence of wildlife on and in the vicinity of airports. If in close proximity to movement areas you observe deer or other large animals, advise the FSS, tower, or airport management.

6. FLIGHTS OVER CHARTED U.S. WILDLIFE REFUGES, PARKS, AND FOREST SERVICE AREAS

6.1 The landing of aircraft is prohibited on lands or waters administered by the National Park Service, U.S. Fish and Wildlife Service or U.S. Forest Service without authorization from the respective agency. Exceptions, including (1) when forced to land due to an emergency beyond the control of the operator, (2) at officially designated landing sites, or (3) an approved official business of the Federal Government.

6.2 All aircraft are requested to maintain a minimum altitude of 2,000 feet above the terrain of the following: National Parks, Monuments, Seashores, Lakeshores, Recreation Areas and Scenic Riverways administered by the National Park Service, National Wildlife Refuges, Big Game Refuges, Game Tanges, and Wildlife Ranges administered by the U.S. Fish and Wildlife Service, and Wilderness and Primitive areas administered by the U.S. Forest Service.

Note - FAA Advisory Circular 91-36, Visual Flight Rules (VFR) Flight Near Noise-Sensitive Areas, defines the*surface* of a National Park Area (including Parks, Forests, Primitive Areas, Wilderness Areas, Recreational Areas, National Seashores, National Monuments, National Lakeshores, and National Wildlife Refuge and Range Areas) as: the highest terrain within 2,000 feet laterally of the route of flight,*or* the upper-most rim of a canyon or valley.

6.3 Federal statutes prohibit certain types of flight activity and/ or provide altitude restrictions over *designated* U.S. Wildlife Refuges, Parks, and Forest Service Areas. These designated areas, for example: Boundary Waters Canoe Wilderness Areas, Minnesota; Haleakala National Park, Hawaii; Yosemite National Park, California; are charted on Sectional Charts.

6.4 Federal regulations also prohibit airdrops by parachute or other means of persons, cargo, or objects from aircraft on lands administered by the three agencies without authorization form the respective agency. Exceptions include: (1) emergencies involving the safety of human life or (2) threat of serious property loss.

ADVISORY AND AIR TRAFFIC INFORMATION SERVICES

1. APPROACH CONTROL SERVICE FOR VFR ARRIVING AIRCRAFT

1.1 Numerous approach control facilities have established programs for arriving VFR aircraft to contact approach control for landing information. This information includes: wind, runway, and altimeter setting at the airport of intended landing. This information may be omitted if contained in the ATIS broadcast and the pilot states the appropriate ATIS code.

Note. — Pilot use of "have numbers" does not indicate receipt of the ATIS broadcast. In addition the controller will provide traffic advisories on a workload permitting basis.

1.2 Such information will be furnished upon initial contact with concerned approach control facility. The pilot will be requested to change to the tower frequency at a predetermined time or point, to receive further landing information.

1.3 Where available, use of this procedure will not hinder the operation of VFR flights by requiring excessive spacing between aircraft or devious routing. Radio contact points will be based on time or distance rather than on landmarks.

1.4 Compliance with this procedure is not mandatory but pilot participation is encouraged. (See RAC-1 TERMINAL RADAR PROGRAMS for VFR AIRCRAFT.)

Note. — Approach control services for VFR aircraft are normally dependent on air traffic control radar. These services are not available during periods of a radar outage. Approach control services for VFR aircraft are limited when Center Radar ARTS Presentation/Processing (CENRAP) is in use.

2. TRAFFIC ADVISORY PRACTICES AT AIRPORTS WITHOUT OPERATING CONTROL TOWERS

2.1 Airport Operations Without Operating Control Tower

2.1.1 There is no substitute for alertness while in the vicinity of an airport. It is essential that pilots be alert and look for other traffic and exchange traffic information when approaching or departing an airport without an operating control tower. This is of particular importance since other aircraft may not have communication capability or, in some cases, pilots may not communicate their presence or intentions when operating into or out of such airports. To achieve the greatest degree of safety, it is essential that all radio-equipped aircraft transmit/receive on a common frequency identified for the purpose of airport advisories.

2.1.2 An airport may have a full or part-time tower or flight service station (FSS) located on the airport, a full or part-time UNICOM station or no aeronautical station at all. There are three ways for pilots to communicate their intention and obtain airport/traffic information when operating at an airport that does not have an operating tower: by communicating with an FSS, a UNICOM operator, or by making a self-announce broadcast.

2.2 Communicating on a Common Frequency

2.2.1 The key to communicating at an airport without an operating control tower is selection of the correct common frequency. The acronym*CTAF* which stands for Common Traffic Advisory Frequency, is synonymous with this program. A CTAF is a frequency designated for the purpose of carrying out airport advisory practices while operating to or from an airport without an operating control tower. The CTAF may be a UNICOM, MULTICOM, FSS, or tower frequency and is identified in appropriate aeronautical publications.

2.2.2 The CTAF frequency for a particular airport is contained in the Airport/Facility Directory (A/FD), Alaska Supplement, Alaska Terminal Publication, Instrument Approach Procedure Charts, and Standard Instruemnt Departure (SID) charts. Also, the CTAF frequency can be obtained by contacting any FSS. Use of the appropriate CTAF, combined with a visual alertness and application of the following recommended good operating practices, will enhance safety of flight into and out of all uncontrolled airports.

2.3 Recommended Traffic Advisory Practices

2.3.1 Pilots of inbound aircraft should monitor and communicate on the designated CTAF from 10 miles to landing. Pilots of departing aircraft should monitor/communicate on the appropriate frequency from start-up, during taxi, and until 10 miles from the airport unless the FARs or local procedures require otherwise.

2.3.2 Pilots of aircraft conducting other than arriving or departing operations at altitudes normally used by arriving and departing aircraft should monitor/communicate on the appropriate frequency while within 10 miles of the airport unless required to do otherwise by the FAR's or local procedures. Such operations include parachute jumping/dropping (see RAC 5, paragraph 8.3), enroute, practicing maneuvers, etc.

2.4 Airport Advisory Service Provided by an FSS.

2.4.1 Airport Advisory Service (AAS) is a service provided by an FSS physically located on an airport which does not have a control tower or where the tower is operated on a part-time basis. The CTAF for FSSs which provide this service will be disseminated in appropriate aeronautical publications.

2.4.2 In communicating with a CTAF FSS, establish two-way communications before transmitting outbound/inbound intentions or information. An inbound aircraft should report approximately 10 miles from the airport, reporting altitude and aircraft type, location relative to the airport, state whether landing or overflight, and request airport advisory. Departing aircraft should state the aircraft type, full identification number, type of flight planned, i.e., VFR or IFR and the planned destination or direction of flight. Report before taxiing and before taxiing on the runway for departure. If communications with a UNICOM are necessary after initial report to FSS, return to FSS frequency for traffic update.

2.4.2.1 Inbound

Example:

VERO BEACH RADIO, CENTURIAN SIX NINER DELTA DELTA IS TEN MILES SOUTH, TWO THOUSAND, LANDING VERO BEACH. REQUEST AIRPORT ADVISORY.

2.4.2.2 Outbound

Example:

VERO BEACH RADIO, CENTURIAN SIX NINER DELTA DELTA, READY TO TAXI, VFR, DEPARTING TO THE SOUTHWEST. REQUEST AIRPORT ADVISORY.

2.4.3 A CTAF FSS provides wind direction and velocity, favored or designated runway, altimeter setting, known traffic, notices to airmen, airport taxi routes, airport traffic pattern information, and instrument approach procedures. These elements are varied so as to best serve the current traffic situation. Some airport managers have specified that under certain wind or other conditions designated runways be used. Pilots should advise the FSS of the runway they intend to use.

CAUTION: All aircraft in the vicinity of an airport may not be in communication with the FSS.

2.5 Information Provided by Aeronautical Advisory Stations (UNICOM)

2.5.1 UNICOM is a nongovernment air/ground radio communication station which may provide airport information at public use airports where there is no tower or FSS.

2.5.2 On pilot request, UNICOM stations may provide pilots with weather information, wind direction, the recommended runway, or other necessary information. If the UNICOM frequency is designated as the CTAF, it will be identified in appropriate aeronautical publications.

2.5.3 Should AAS by an FSS or, Aeronautical Advisory Station (UNICOM) be unavailable, wind and weather information may be obtainable from nearby controlled airports via Automatic Terminal Information Service (ATIS) or Automated Weather Observing System (AWOS) frequency.

2.6 Self-Announce Position and/or Intentions

2.6.1 *General.* "Self-announce" is a procedure whereby pilots broadcast their position or intended flight activity or ground operation on the designated CTAF. This procedure is used primarily at airports which do not have an FSS on the airport. The self-announce procedure should also be used if a pilot is unable to communicate with the FSS on the designated CTAF.

2.6.2 If an airport has a tower and it is temporarily closed, or operated on a part-time basis and there is no FSS on the airport or the FSS is closed, use the CTAF to self-announce your position or intentions.

2.6.3 Where there is no tower, FSS, or UNICOM station on the airport, use MULTICOM frequency 122.9 for self-announce procedures. Such airports will be identified in appropriate aeronautical information publications.

2.6.4 *Practice Approaches.* Pilots conducting practice instrument approaches should be particularly alert for other aircraft that may be departing in the opposite direction. When conducting any practice approach, regardless of its direction relative to other airport operations, pilots should make announcements on the CTAF as follows:

2.6.4.1 departing the final approach fix, inbound (non precision approach) or departing the outer marker or fix used in lieu of the outer marker, inbound (precision approach);

2.6.4.2 established on the final approach segment or immediately upon being released by ATC;

2.6.4.3 upon completion or termination of the approach; and

2.6.4.4 upon executing the missed approach procedure.

2.6.5 Departing aircraft should always be alert for arrival aircraft coming from the opposite direction.

2.6.6 *Recommended Self-Announce Phraseologies:* It should be noted that aircraft operating to or from another another nearby airport may be making self-announce broadcasts on the same UNICOM or MULTICOM frequency. To help identify one airport from another, the airport name should be spoken at the beginnig and end of each self-announce transmission.

2.6.6.1 Inbound

Example:

STRAWN TRAFFIC, APACHE TWO TWO FIVE ZULU, (POSITION), (ALTITUDE), (DESCENDING) OR ENTERING DOWNWIND/BASE/FINAL (AS APPROPRIATE) RUNWAY ONE SEVEN FULL STOP, TOUCH-AND-GO, STRAWN.

STRAWN TRAFFIC APACHE TWO TWO FIVE ZULU CLEAR OF RUNWAY ONE SEVEN STRAWN.

2.6.6.2 Outbound

Example:

STRAWN TRAFFIC, QUEEN AIR SEVEN ONE FIVE FIVE BRAVO (LOCATION ON AIRPORT) TAXIING TO RUNWAY TWO SIX STRAWN.

STRAWN TRAFFIC, QUEEN AIR SEVEN ONE FIVE FIVE BRAVO DEPARTING RUNWAY TWO SIX. "DEPARTING THE PATTERN TO THE (DIRECTION), CLIMBING TO (ALTITUDE) STRAWN."

2.6.6.3 Practice Instrument Approach

Example:

STRAWN TRAFFIC, CESSNA TWO ONE FOUR THREE QUEBEC (POSITION FROM AIRPORT) INBOUND DESCENDING THROUGH (ALTITUDE) PRACTICE (NAME OF APPROACH) APPROACH RUNWAY THREE FIVE STRAWN.

STRAWN TRAFFIC, CESSNA TWO ONE FOUR THREE QUEBEC PRACTICE (TYPE) APPROACH COMPLETED OR TERMINATED RUNWAY THREE FIVE STRAWN.

2.7 UNICOM Communication Procedures

2.7.1 In communicating with a UNICOM station, the following practices will help reduce frequency congestion, facilitate a better understanding of pilot intentions, help identify the location of aircraft in the traffic pattern, and enhance safety of flight:

2.7.1.1 Select the correct UNICOM frequency.

2.7.1.2 State the identification of the UNICOM station you are calling in each transmission.

2.7.1.3 Speak slowly and distinctly.

2.7.1.4 Report approximately 10 miles from the airport, reporting altitude, and state your aircraft type, aircraft idenification, location relative to the airport, state whether landing or overflight, and request wind information and runway in use.

2.7.1.5 Report on downwind, base and final approach.

2.7.1.6 Report leaving the runway.

2.7.2 *Recommended UNICOM Phraseologies:*

2.7.2.1 Inbound.

Example:

FREDERICK UNICOM CESSNA EIGHT ZERO ONE TANGO FOXTROT 10 MILES SOUTHEAST DESCENDING THROUGH (ALTITUDE) LANDING FREDERICK, REQUEST WIND AND RUNWAY INFORMATION FREDERICK.

FREDERICK TRAFFIC CESSNA EIGHT ZERO ONE TANGO FOXTROT ENTERING DOWNWIND/BASE/FINAL (AS APPROPRIATE) FOR RUNWAY ONE NINER FULL STOP/TOUCH-AND-GO FREDERICK.

FREDERICK TRAFFIC CESSNA EIGHT ZERO ONE TANGO FOXTROT CLEAR OF RUNWAY ONE NINER FREDERICK.

2.7.2.2 Outbound

Example:

FREDERICK UNICOM CESSNA EIGHT ZERO ONE TANGO FOXTROT (LOCATION ON AIRPORT) TAXIING TO RUNWAY ONE NINE, REQUEST WIND AND TRAFFIC INFORMATION FREDERICK.

FREDERICK TRAFFIC CESSNA EIGHT ZERO ONE TANGO FOXTROT DEPARTING RUNWAY ONE NINE. "REMAINING IN THE PATTERN" OR "DEPARTING THE PATTERN TO THE (DIRECTION) (AS APPROPRIATE)" FREDERICK.

Summary of Recommended Communication Procedures

Facility At Airport	Frequency Use	Broadcast Position	
		Outbound	Inbound
1. UNICOM (No Tower or FSS).	Communicate with UNICOM station on published CTAF frequency (122.7, 122.8, 122.725, 122.975, or 123.0). If unable to contact UNICOM station, use self-announce procedures on CTAF..	Before taxiing and before taxiing on the runway for departure..	10 miles out. Entering downwind, base, and final. Leaving the runway.
2. No Tower, FSS, or UNICOM.	Self-announce on MULTICOM frequency 122.9..	Before taxiing and before taxiing on the runway for departure..	10 miles out. Entering downwind, base, and final. Leaving the runway.
3. No Tower in operation, FSS open.	Communicate with FSS on CTAF..	Before taxiing and before taxiing on the runway for departure..	10 miles out. Entering downwind, base, and final. Leaving the runway.
4. FSS closed (No Tower).	Self-announce on CTAF.	Before taxiing and before taxiing on the runway for departure..	10 miles out. Entering downwind, base, and final. Leaving the runway.
5. Tower or FSS not in operation.	Self-announce on CTAF.	Before taxiing and before taxiing on the runway for departure..	10 miles out. Entering downwind, base, and final. Leaving the runway.

3. IFR APPROACHES/GROUND VEHICLE OPERATIONS

3.1 IFR Approaches

When operating in accordance with an IFR clearance and ATC approves a change to the advisory frequency, make an expeditious change to the CTAF and employ the recommended traffic advisory procedures.

3.2 Ground Vehicle Operation

Airport ground vehicles equipped with radios should monitor the CTAF frequency when operating on the airport movement area and remain clear of runways/taxiways being used by aircraft. Radio transmissions from ground vehicles should be confined to safety-related matters.

3.3 Radio Control of Airport Lighting Systems

Whenever possible, the CTAF will be used to control airport lighting systems at airports without operating control towers. This eliminates the need for pilots to change frequencies to turn the lights on and allows a continuous listening watch on a single frequency. The CTAF is published on the instrument approach chart and in other appropriate aeronautical information publications. For further details concerning radio controlled lights, see AC 150/5340.27.

4. DESIGNATED UNICOM/MULTICOM FREQUENCIES

4.1 Communicatons Between Aircraft

CAUTION The Federal Communications Commissions (FCC) requires an aircraft station license to operate on UNICOM/MULTICOM frequencies and usage must be in accordance with Part 87 of the FCC Rules (see Section 87.29 regarding license applications). Misuse of these frequencies may result in either the imposition of fines and/or revocation/suspension of FCC aircraft station license.

4.2 Frequency Use

4.2.1 The following listing depicts UNICOM and MULTICOM frequency uses as designated by the Federal Communications Commission (FCC).

USE	FREQUENCY
Airports without an operating control tower..	122.700, 122.725, 122.800, 122.975, 123.000, 123.050, 123.075
(MULTICOM frequency) Activities of a temporary, seasonal, emergency nature or search and rescue, as well as, airports with no tower, FSS, or Unicom..	122.900
(MULTICOM frequency) Forestry management and fire suppression, fish and game management and protection, and environmental monitoring and protection..	122.925
Airports with control tower or FSS on airport.	122.950

NOTE — In some areas of the country, frequency interference may be encountered from nearby airports using the same UNICOM frequency. Where there is a problem, UNICOM operators are encouraged to develop a *least interference* frequency assignment plan for airports concerned using the frequencies designated for airports without operating control towers. UNICOM licensees are encouraged to apply for UNICOM 25 kHz spaced channel frequencies. Due to the extremely limited number of frequencies with 50 kHz channel spacing, 25 kHz channel spacing should be implemented. UNICOM licensees may then request FCC to assign frequencies in accordance with the plan, which FCC will review and consider for approval.

NOTE — Wind direction and runway information may not be available on UNICOM frequency 122.950.

4.2.2 The following listing depicts other frequency uses as designated by the Federal Communications Commission (FCC).

USE	FREQUENCY
Air-to-air communications & private airports (not open to the public).	122.750, 122.850
Air-to-air communications (general aviation helicopters).	123.025
Aviation instruction, Glider, Hot Air Balloon **(not to be used for advisory service).**	123.300, 123.500

5. USE OF UNICOM FOR ATC PURPOSES

5.1 UNICOM service may be used for air traffic control purposes, only under the following circumstances:

5.1.1 Revision to proposed departure time.

5.1.2 Takeoff, arrival, or flight plan cancellation time.

5.1.3 ATC clearance, provided arrangements are made between the ATC facility and the UNICOM licensee to handle such messages.

6. AUTOMATIC TERMINAL INFORMATION SERVICE (ATIS)

6.1 ATIS is the continuous broadcast of recorded, noncontrol information in selected high activity terminal areas. Its purpose is to improve controller effectiveness and to relieve frequency congestion by automating the repetitive transmission of essential but routine information. Pilots are urged to cooperate in the ATIS program as it relieves frequency congestion on approach control, ground control, and local control frequencies. The Airport/Facility Directory indicates airports for which ATIS is provided.

6.2 ATIS information includes the time of the latest weather sequence, ceiling, visibility, obstructions to visibility, temperature, dew point (if available), wind direction (magnetic), and velocity, altimeter, other pertinent remarks, instrument approach and runway in use. The ceiling/sky condition, visibility, and obstructions to vision may be omitted from the ATIS broadcast if the ceiling is above 5,000 feet and the visibility is more than 5 miles. ATIS is continuously broadcast on the voice feature of a TVOR/VOR/VORTAC located on or near the airport, or on a discreet VHF/UHF frequency. The departure runway will only be given if different from the landing runway except at locations having a separate ATIS for departure. The broadcast may include the appropriate frequency and instructions for VFR arrivals to make initial contact with approach control. Pilots of aircraft arriving or departing the terminal area can receive the continuous ATIS broadcast at times when cockpit duties are least pressing and listen to as many repeats as desired. ATIS broadcast shall be updated upon the receipt of any official hourly and special weather. A new recording will also be made when there is a change in other pertinent data such as runway change, instrument approach in use, etc.

Sample Broadcast:

DULLES INTERNATIONAL INFORMATION SIERRA. 1300ZULU WEATHER. MEASURED CEILING THREE THOUSAND OVERCAST. VISIBILITY THREE, SMOKE. TEMPERATURE SIX EIGHT. WIND THREE FIVE ZERO AT EIGHT. ALTIMETER TWO NINER NINER TWO. ILS RUNWAY ONE RIGHT APPROACH IN USE. LANDING RUNWAY ONE RIGHT AND LEFT. DEPARTURE RUNWAY THREE ZERO. ARMEL VORTAC OUT OF SERVICE. ADVISE YOU HAVE SIERRA.

6.3 Pilots should listen to ATIS broadcasts whenever ATIS is in operation.

6.4 Pilots should notify controllers on initial contact that they have received the ATIS broadcast by repeating the alphabetical code word appended to the broadcast.

Examples:

"INFORMATION SIERRA RECEIVED."

6.5 When the pilot acknowledges that he has received the ATIS broadcast, controllers may omit those items contained on the broadcast if they are current. Rapidly changing conditions will be issued by Air Traffic Control and the ATIS will contain words as follows:

"LATEST CEILING/VISIBILITY/ALTIMETER/WIND/ (OTHER CONDITIONS) WILL BE ISSUED BY APPROACH CONTROL/TOWER."

The absence of a sky condition/ceiling and/or visibility on ATIS indicates a sky condition/ceiling of 5,000 feet or above and visibility of 5 miles or more. A remark may be made on the broadcast, "The weather is better than 5,000 and 5," or the existing weather may be broadcast.

6.6 Controllers will issue pertinent information to pilots who do not acknowledge receipt of a broadcast or who acknowledge receipt of a broadcasts which is not current.

6.7 To serve frequency-limited aircraft, Flight Service Stations (FSS) are equipped to transmit on the omnirange frequency at most en route VORs used as ATIS voice outlets. Such communication interrupts the ATIS broadcast. Pilots of aircraft equipped to receive on other FSS frequencies are encouraged to do so in order that these override transmissions may be kept to an absolute minimum.

6.8 While it is a good operating practice for pilots to make use of the ATIS broadcast where it is available, some pilots use the phrase "Have Numbers" in communications with the control tower. Use of this phrase means that the pilot has received wind, runway and altimeter information ONLY and the tower does not have to repeat this information. It does not indicate receipt of the ATIS broadcast and should never be used for this purpose.

7. SPECIAL TRAFFIC MANAGEMENT PROGRAMS

7.1 Special procedures may be established when a location requires special traffic handling to accommodate above normal traffic demand (e.g., the Indianapolis 500, the Super Bowl) or reduced airport capacity (e.g., airport runway/taxiway closures for airport construction). The special procedures may remain in effect until the problem has been resolved or until local traffic management procedures can handle the situation and a need for special handling no longer exists.

7.2 The Airport Reservations Office (ARO) has been established to monitor the operation of the high density rule required by FAR Part 93, Subpart K. The ARO receives and processes all IFR requests for operations at designated high density traffic airports and allots reservations on a "first come, first serve" basis determined at the time the request is received at the office. Standby lists are not maintained. The toll free number to obtain a slot are: TouchTone or Rotary Phone 1-800-875-9694. For Personal computer with modem 1-800-875-9759.

7.3 The high density airports are: John F. Kennedy International Airport, La Guardia Airport, Chicago O'Hare International Airport, and Washington National Airport.

7.3.1 Reservations for John F. Kennedy International Airport are required between 3 p.m. and 7:59 p.m. local time.

7.3.2 Reservations at Chicago O'Hare International Airport are required between 6:45 a.m. and 9:15 p.m. local time.

7.3.3 Reservations for La Guardia Airport and Washington National Airport are required between 6 a.m. and 11:59 p.m. local time.

7.4 Requests for IFR reservations will be accepted 48 hours prior to the proposed time of operation at the affected airport. An exception to the 48-hour limitation is made for holidays.

8. HEAVY TRAFFIC AROUND MILITARY FIELDS

8.1 Pilots are advised to exercise vigilance when in close proximity to most military airports. These airports may have jet aircraft traffic patterns extending up to 2,500 feet above the surface. In addition, they may have an unusually heavy concentration of jet aircraft operating within a 25 nautical mile radius and from the surface to all altitudes. The precautionary note also applies to the larger civil airports.

GENERAL

1. INTRODUCTION

1.1 Responsible Authority

1.1.1 The Search and Rescue service in the United States and its area of jurisdiction is organized in accordance with the Standards and Recommended Practices of ICAO Annex 12 by the Federal Aviation Administration with the collaboration of the United States Coast Guard and the United States Air Force. The Coast Guard and the Air Force are the responsible Search and Rescue authorities and have the responsibility for making the necessary facilities available. Postal and telegraphic address for the Federal Aviation Administration are given on page Gen 1-1. The appropriate address for Coast Guard and Air Force offices are:

(A) Air Force
Postal Address:
Inland SAR Coordinator
Commander ARRS
USAF RCC
Scott AFB, Ill. 62225
Telegraphic Address: None.
Telex: None.

(B) Coast Guard
Postal Address:
United States Coast Guard
Search and Rescue Division (GOSR/73)
400 7th Street, S.W.
Washington, D.C. 20590
Telegraphic Address: None.
Telex: 89 2427

2. TYPES OF SERVICE

2.1 Details of the Rescue Coordination Centers and related rescue units are given on page SAR 1-1. In addition, various elements of state and local police organizations are available for search and rescue missions when required. The aeronautical, maritime and public telecommunication services are available to the search and rescue organizations.

2.2 Aircraft, both land and amphibious based, are used, as well as land and seagoing vessels, when required, and carry survival equipment. Airborne survival equipment, capable of being dropped, consists of inflatable rubber dinghies equipped with medical supplies, emergency rations and survival radio equipment. Aircraft and marine craft are equipped to communicate on 121.5, 123.1, 243.0, 500 kHz, 2182 kHz, and 8364 kHz. Ground rescue teams are equipped to communicate on 121.5 MHz, 500 kHz, and 8364 kHz. SAR aircraft and marine craft are equipped with direction finding equipment and radar.

3. SAR AGREEMENTS

3.1 Bilateral agreements exist between the U.S. and the following neighboring States of the NAM region: Canada and Mexico.

3.1.1 There are two agreements with Canada. One provides for public aircraft of either country which are engaged in air search and rescue operations to enter or leave either country without being subjected to immigration or customs formalities normally required. The other permits vessels and wrecking appliances of either country to render aid and assistance on specified border waters and on the shores and in the waters of the other country along the Atlantic and Pacific Coasts within a distance of 30 miles from the international boundary on those coasts. A post operations report is required.

3.1.2 The agreement with Mexico applies to territorial waters and shores of each country within 200 miles of the border on the Gulf Coast and within 270 miles of the border on the Pacific Coast. It permits the vessels and aircraft of either country to proceed to the assistance of a distressed vessel or aircraft of their own registry upon notification of entry and of departure of the applicable waters and shores.

3.2 In situations not falling under the above agreements, requests from States to participate in a SAR operation within the United States for aircraft of their own registry may be addressed to the nearest Rescue Coordination Center. The Rescue Coordination Center would reply, and issue appropriate instructions.

4. GENERAL CONDITIONS OF AVAILABILITY

4.1 The SAR service and facilities in the U.S. are available to the Neighboring States within the NAM, NAT, CAR, PAC Regions upon request to the appropriate Rescue Coordination Center at all times when they are not engaged in search and rescue activity in their home territory. All facilities are specialized in SAR techniques and functions.

5. APPLICABLE ICAO DOCUMENTS

Annex 12	Search and Rescue
Annex 13	Aircraft Accident Inquiry
Doc 7030	Regional Supplementary Procedures for Alerting and Search and Rescue Services applicable to the NAM, NAT, CAR, PAC Regions.

6. DIFFERENCES FROM ICAO STANDARDS, RECOMMENDED PRACTICES AND PROCEDURES

See AIP section DIF.

7. EMERGENCY LOCATOR TRANSMITTERS

7.1 General

Emergency Locator Transmitters (ELT's) are required for most general aviation airplanes (reference: FAR 91.207). ELT's of various types have been developed as a means of locating downed aircraft. These electronic, battery operated transmitters emit a distinctive downward swept audio tone on 121.5 MHz and/or 243.0 MHz. If "armed" and when subject to crash generated forces they are designed to automatically activate and continuously emit these signals. The transmitters will operate continuously for at least 48 hours over a wide temperature range. A properly installed and maintained ELT can expedite search and rescue operations and save lives.

7.2 ELT Testing

7.2.1 ELT's should be tested in accordance with the manufacturer's instructions, preferably in a shielded or screened room to prevent the broadcast of signals which could trigger a false alert. When this cannot be done, aircraft operational testing is authorized on 121.5 MHz and 243.0 MHz as follows:

a. Tests should be conducted only during the first 5 minutes after any hour. If operational tests must be made outside of this time-frame, they should be coordinated with the nearest FAA Control Tower or FSS.

b. Tests should be no longer than 3 audible sweeps.

c. If the antenna is removable, a dummy load should be substituted during test procedures.

d. Airborne tests are not authorized.

7.3 False Alarms

7.3.1 Caution should be exercised to prevent the inadvertent activation of ELT's in the air or while they are being handled on the ground. Accidental or unauthorized activation will generate an emergency signal that cannot be distinguished from the real thing, leading to expensive and frustrating searches. A false ELT signal could also interfere with genuine emergency transmissions and hinder or prevent the timely location of crash sites. Frequent false alarms could also result in complacency and decrease the vigorous reaction that must be attached to all ELT signals. Numerous cases of inadvertent activation have occurred as a result of aerobatics, hard landings, movement by ground crews and aircraft and aircraft maintenances. These false alarms can be minimized by monitoring 121.5 MHz and/or 243.0 MHz as follows:

a. Inflight when a receiver is available.

b. Prior to engine shut-down at the end of each flight.

c. When the ELT is handled during installation or maintenance.

d. When maintenance is being performed in the vicinity of the ELT.

e. When the aircraft is moved by a ground crew.

f. If an ELT signal is heard, turn off the ELT to determine if it is transmitting. If it has been activated, maintenance might be required before the unit is returned to the "ARMED" position.

7.4 ELT Reporting Procedures

Pilots are encouraged to monitor 121.5 MHz and/or 243.0 MHz while in flight to assist in identifying possible emergency ELT transmissions. On receiving a signal from an Emergency Locator Transmitter report the following information to the nearest FAA facility:

a. Your position at time the signal was first heard.

b. Your position at time the signal was last heard.

c. Your position at maximum signal strength.

d. Flight altitude and frequency on which the emergency signal was heard. (121.5/243.0)

Note — If possible, positions should be given relative to a navigation aid. If the aircraft has homing equipment, provide the bearing to the emergency signal with each reported position.

8. ACCIDENT CAUSE FACTORS

8.1 The ten most frequent cause factors for General Aviation Accidents in 1978 that involve the pilot in command are:

Inadequate preflight preparation and/or planning
Failure to obtain/maintain flying speed
Failure to maintain direction control
Improper level off
Failure to see and avoid objects or obstructions
Mismanagement of fuel
Improper in-flight decisions or planning
Misjudgment of distance and speed
Selection of unsuitable terrain
Improper operation of flight controls

8.2 The above factors have continued to plague General Aviation pilots over the years. This list remains relatively stable and points out the need for continued refresher training to establish a higher level of flight proficiency for all pilots. A part of the FAA's continuing effort to promote increased aviation safety is the General Aviation Accident Prevention Program. For information on Accident Prevention activities contact information on Accident Prevention activities contact any General Aviation or Flight Standards District Office.

8.3 Be alert at all times, especially when the weather is good. Most pilots pay attention to business when they are operating in full IFR weather conditions, but strangely, air collisions almost invariably have occurred under ideal weather conditions. Unlimited visibility appears to encourage a sense of security which is not at all justified. Considerable information of value may be obtained by listening to advisories being issued in the terminal area, even though controller workload may prevent a pilot from obtaining individual service.

8.4 If you think another aircraft is too close to you, give way instead of waiting for the other pilot to respect the right-of-way to which you may be entitled. It is a lot safer to pursue the right-of-way angle after you have completed your flight.

8.5 VFR In Congested Area

A high percentage of near midair collisions occur below 8,000 feet AGL and within 30 miles of an airport. When operating VFR in highly congested areas, whether you intend to land at an airport within the area or are just flying through, it is recommended that extra vigilance be maintained and that you monitor an appropriate control frequency. Normally the appropriate frequency is an approach control frequency. By such monitoring action you can "get the picture" of the traffic in your area. When the approach controller has radar, traffic advisories may be given to VFR pilots who request them, subject to the provisions included in RADAR TRAFFIC INFORMATION SERVICE in RAC 1.

8.6 Obstructions to Flight

8.6.1 General

8.6.1.1 Many structures exist that could significantly affect the safety of your flight when operating below 500 feet above ground level (AGL), and particularly below 200 feet AGL. While FAR part 91.119 allows flight below 500 AGL when over sparcely populated areas or open water, such operations are very dangerous. At and below 200 feet AGL there are numerous power lines, antenna towers, etc., that are not marked and lighted as obstructions and therefore may not be seen in time to avoid a collision. Notices to Airmen (NOTAMS) are issued on those lighted structures experiencing temporary light outages. However, some time may pass before the FAA is notified of these outages, and the NOTAM issued, thus pilot vigilance is imperative.

8.6.2 Antenna Towers

8.6.2.1 Extreme caution should be exercised when flying less that 2,000 feet above ground level (AGL) because of numerous skeletal structures, such as radio and television antenna towers, that exceed 1,000 feet AGL with some extending higher than 2,000 feet AGL. Most skeletal structures are supported by guy wires which are very difficult to see in good weather and can be invisible at dusk or during periods of reduced visibility. These wires can extend about 1,500 feet horizontally from a structure; therefore, all skeletal structures should be avoided horizontally by at least 2,000 feet. Additionally, new towers may not be on your current chart because the information was not received prior to the printing of the chart.

8.6.3 Overhead Wires

8.6.3.1 Overhead transmission and utility lines often span approaches to runways, natural flyways such as lakes, rivers, gorges, and canyons, and cross other landmarks pilots frequently follow such as highways, railroad tracks, etc. As with antenna towers, these high voltage/power lines or the supporting structures of these lines may not always be readily visible and the wires may be virtually impossible to see under certain conditions. In some locations, the supporting structures of overhead transmission lines are equipped with unique sequence flashing white strobe light systems to indicate that there are wires between the structures. However, many power lines do not require notice to the FAA and, therefore, are not marked and/or lighted. Many of those that do require notice do not exceed 200 feet AGL or meet the Obstruction Standard of FAR part 77 and, therefore, are not marked and/or lighted. All pilots are cautioned to remain extremely vigilant for these power lines or their supporting structures when following natural flyways or during the approach and landing phase. This is particularly important for seaplane and/or float equipped aircraft when landing on, or departing from, unfamiliar lakes or rivers.

8.6.4 Other Objects/Structures

8.6.4.1 There are other objects or structures that could adversely affect your flight such as construction cranes near an airport, newly constructed buildings, new towers, etc. Many of these structures do not meet charting requirements or may not yet be charted because of the charting cycle. Some structures do not require obstruction marking and/or lighting and some may not be marked and lighted even though the FAA recommended it.

8.7 Avoid Flight Beneath Unmanned Balloons

8.7.1 The majority of unmanned free balloons currently being operated have, extended below them, either a suspension device to which the payload or instrument package is attached, or a trailing wire antenna, or both. In many instances these balloon subsystems may be invisible to the pilot until his aircraft is close to the balloon, thereby creating a potentially dangerous situation. Therefore, good judgment on the part of the pilot dictates that aircraft should remain well clear of all unmanned free balloons and flight below then should be avoided at all times.

8.7.2 Pilots are urged to report any unmanned free balloons sighted to the nearest FAA ground facility with which communication is established. Such information will assist FAA ATC facilities to identify and flight follow unmanned free balloons operating in the airspace.

9. MOUNTAIN FLYING

9.1 Your first experience of flying over mountainous terrain (particularly if most of your flight time has been over the flatlands of the midwest) could be a never-to-be forgotten nightmare if proper planning is not done and if you are not aware of the potential hazards awaiting. Those familiar section lines are not present in the mountains; those flat, level fields for forced landings are practically nonexistent; abrupt changes in wind direction and velocity occur; severe updrafts and downdrafts are common, particularly near or above abrupt changes of terrain such as cliffs or rugged areas; even the clouds look different and can build up with startling rapidity. Mountain flying need not be hazardous if you follow the recommendations below.

9.2 File a flight plan. Plan your route to avoid topography which would prevent a safe forced landing. The route should be over populated areas and well known mountain passes. Sufficient altitude should be maintained to permit gliding to a safe landing in the event of engine failure.

9.3 Don't fly a light aircraft when the winds aloft, at your proposed altitude, exceed 35 miles per hour. Expect the winds to be of much greater velocity over mountain passes than reported a few miles from them. Approach mountain passes with as much altitude as possible. Downdrafts of from 1,500 to 2,000 feet per minute are not uncommon on the leeward side.

9.4 Don't fly near or above abrupt changes in terrain. Severe turbulence can be expected, especially in high wind conditions.

9.5 Some canyons run into a dead end. Don't fly so far up a canyon that you get trapped. ALWAYS BE ABLE TO MAKE A 180 DEGREE TURN

9.6 VFR flight operations may be conducted at night in mountainous terrain with the application of sound judgment and common sense. Proper pre-flight planning, giving ample consideration to winds and weather, knowledge of the terrain and pilot experience in mountain flying are prerequisites for safety of flight. Continuous visual contact with the surface and obstructions is a major concern and flight operations under an overcast or in the vicinity of clouds should be approached with extreme caution.

9.7 When landing at a high altitude field, the same indicated airspeed should be used as at low elevation fields.*Remember:* that due to the less dense air at altitude, this same indicated airspeed actually results in a higher true airspeed, a faster landing speed, and more important, a longer landing distance. During gusty wind conditions which often prevail at high altitude fields, a power approach and power landing is recommended. Additionally, due to the faster groundspeed, your takeoff distance will increase considerably over that required at low altitudes.

9.8 *Effects of Density Altitude.* Performance figures in the aircraft owner's handbook for length of takeoff run, horsepower, rate of climb, etc., are generally based on standard atmosphere conditions (59° F, pressure 29.92 inches of mercury) at sea level. However, inexperienced pilots as well as experienced pilots may run into trouble when they encounter an altogether different set of conditions. This is particularly true in hot weather and at higher elevations. Aircraft operations at altitudes above sea level and at higher than standard temperatures are commonplace in mountainous area. Such operations quite often result in a drastic reduction of aircraft performance capabilities because of the changing air density. Density altitude is a measure of air density. It is not to be confused with pressure altitude — true altitude or absolute altitude. It is not to be used as a height reference, but as a determining criteria in the performance capability of an aircraft. Air density decreases with altitude. As air density decreases, density altitude increases. The further effects of high temperature and high humidity are cumulative, resulting in an increasing high density altitude condition. High density altitude reduces all aircraft performance parameters. To the pilot, this means that — the normal horsepower output is reduced, propeller efficiency is reduced and a higher true airspeed is required to sustain the aircraft throughout its operating parameters. It means an increase in runway length requirements for takeoff and landings, and a decreased rate of climb. (Note. — A turbocharged aircraft engine provides some slight advantage in that it provides sea level horsepower up to a specified altitude above sea level.) An average small airplane, for example, requiring 1,000 feet for takeoff at sea level under standard atmospheric conditions will require a takeoff run of approximately 2,000 at an operational altitude of 5,000 feet.

9.8.1 *Density Altitude Advisories.* At airports with elevations of 2,000 feet and higher, control towers and flight service stations will broadcast the advisory "Check Density Altitude" when the temperature reaches a predetermined level. These advisories will be broadcast on appropriate tower frequencies or, where available ATIS. Flight Service Stations will broadcast these advisories as a part of Airport Advisory Service, and on TWEB.

9.8.2 These advisories are provided by air traffic facilities, as a reminder to pilots that high temperatures and high field elevations will cause significant changes in aircraft characteristics. The pilot retains the responsibility to compute density altitude, when appropriate, as a part of preflight duties.

Note — All flight service stations will compute the current density altitude upon request.

9.9 *Mountain Wave.* Many pilots go all their lives without understanding what a mountain wave is. Quite a few have their lives because of this lack of understanding. One need not be a licensed meteorologist to understand the mountain wave phenomenon.

9.9.1 Mountain waves occur when air is being blown over a mountain range or even the ridge of a sharp bluff area. As the air hits the upwind side of the range, it starts to climb, thus creating what is generally a smooth updraft which turns into a turbulent downdraft as the air passes the crest of the ridge. From this point, for many miles downwind, there will be a series of downdrafts and updrafts. Satellite photos of the Rockies have shown mountain waves extending as far as 700 miles downwind of the range. Along the east coast area, such photos of the Appalachian chain have picked up the mountain wave phenomenom over a hundred miles eastward. All it takes to form a mountain wave is wind blowing across the range at 15 knots or better at an intersection angle of not less than 30 degrees.

9.9.2 Pilots from flatland areas should understand a few things about mountain waves in order to stay out of trouble. Approaching a mountain range from the upwind side (generally the west), there will usually be a smooth updraft; therefore, it is not quite as dangerous an area as the lee of the range. From the leeward side, it is always a good idea to add an extra thousand feet or so of altitude because downdrafts can exceed the climb capability of the aircraft. Never expect an updraft when approaching a mountain chain from the leeward. Always be prepared to cope with a downdraft and turbulence.

9.9.3 When approaching a mountain ridge from the downwind side, it is recommended that the ridge be approached at approximately a 45° angle to the horizontal direction of the ridge. This permits a safer retreat from the ridge with less stress on the aircraft should severe turbulence and downdraft be experienced. If severe turbulence is encountered, simultaneously reduce power and adjust pitch until aircraft approaches maneuvering speed, then adjust power and trim to maintain maneuvering speed and fly away from to turbulent area.

10. SEAPLANE SAFETY

10.1 Acquiring a seaplane class rating affords access to many areas not available to landplane pilots. Adding a seaplane class rating to your pilot certificate can be relatively uncomplicated and inexpensive. However, more effort is required to become a safe, efficient, competent "bush" pilot. The natural hazards of the backwoods have given way to modern man-made hazards. Except for the far north, the available bodies of water are no longer the exclusive domain of the airman. Seaplane pilots must be vigilant for hazards such as electric power lines, power, sail and rowboats, rafts, mooring lines, water skiers, swimmers, etc.

10.2 Seaplane pilots must have a thorough understanding of the right-of-way rules as they apply to aircraft versus other vessels. Seaplane pilots are expected to know and adhere to both the United States Coast Guard's (USCG) Inland Navigation Rules and FAR Part 91.115, Right of Way Rules; Water Operations. The navigation rules of the road are a set of collision avoidance rules as they apply to aircraft on the water. A seaplane is considered a vessel when on the water for the purposes of these collision avoidance rules. In general, a seaplane on the water shall keep well clear of all vessels and avoid impeding their navigation. The FAR requires, in part, that aircraft operating on the water "...shall, insofar as possible, keep clear of all vessels and avoid impeding their navigation and shall give way to any vessel or other aircraft that is given the right of way ...." This means that a seaplane should avoid boats and commercial shipping when on the water. If on a collision course, the seaplane should slow, stop, or maneuver to the right, away from the bow of the oncoming vessel. Also, while on the surface with an engine running, an aircraft must give way to all non-powered vessels. Since a seaplane in the water may not be as maneuverable as one in the air, the aircraft on the water has right-of-way over one in the air, and one taking off has right-of-way over one landing. A seaplane is exempt from the USCG safety equipment requirements, including the requirements for Personal Floatation Devices (PFD). Requiring seaplanes on the water to comply with USCG equipment requirements in addition to the FAA equipment requirements would be an unnecessary burden on seaplane owners and operators.

10.3 Unless they are under Federal jurisdiction, navigable bodies of water are under the jurisdiction of the state, or in a few cases, privately owned. Unless they are specifically restricted, aircraft have as much right to operate on these bodies of water as other vessels. To avoid problems, check with Federal or local officials in advance of operating on unfamiliar waters. In addition to the agencies listed in Table 1, the nearest Flight Standards District Office can usually offer some practical suggestions as well as regulatory information. If you land on a restricted body of water because of an inflight emergency, or in ignorance of the restrictions you have violated, report as quickly as practical to the nearest local official having jurisdiction and explain your situation.

AUTHORITY TO CONSULT FOR USE OF A BODY OF WATER

Location	Authority	Contact
Wilderness Area	U.S. Department of Agriculture, Forest Service	Local forest ranger
National Forest	USDA Forest Service	Local forest ranger
National Park	U.S. Department of the Interior, National Park Service	Local park ranger
Indian Reservation	USDI, Bureau of Indian Affairs	Local Bureau office
State Park	State government or state forestry or park service	Local state aviation office for further information
Canadian National and Provincial Parks	Supervised and restricted on an individual basis from province to province and by different departments of the Canadian government; consult Canadian Flight Information Manual and/or Water Aerodrome Supplement	Park superintendent in an emergency

10.4 When operating over or into remote areas, appropriate attention should be given to survival gear. Minimum kits are recommended for summer and winter, and are required by law for flight into sparsely settled areas of Canada and Alaska. Alaska State Department of Transportation and Canadian Ministry of Transport officials can provide specific information on survival gear requirements. The kit should be assembled in one container and be easily reachable and preferably floatable.

10.5 The FAA recommends that each seaplane owner or operator provide flotation gear for occupants any time a seaplane operates on or near water. FAR Section 91.205(b)(11) requires approved flotation gear for aircraft operated for hire over water and beyond power-off gliding distance from shore. FAA-approved gear differs from that required for navigable waterways under USCG rules. FAA-approved life vests are inflatable designs as compared to the USCG's non-inflatable PFD's that may consist of solid, bulky material. Such USCG PFD's are impractical for seaplanes and other aircraft because they may block passage through the relatively narrow exits available to pilots and passengers. Life vests approved under Technical Standard Order (TSO) C13E contain fully inflatable compartments. The wearer inflates the compartments (AFTER exiting the aircraft) primarily by independent CO2 cartridges, with an oral inflation tube as a backup. The flotation gear also contains a water-activated, self-illuminating signal light. The fact that pilots and passengers can easily don and wear inflatable life vests (when not inflated) provides maximum effectiveness and allows for unrestricted movement. It is imperative that passengers are briefed on the location and proper use of available PFD's prior to leaving the dock.

10.6 The FAA recommends that seaplane owners and operators obtain Advisory Circular (AC) 91-69, Seaplane Safety, free from the U.S. Department of Transportation, Utilization and Storage Section, M-443.2, Washington, DC 20590. The Navigation Rules are available from the Government Printing Office for $8 and can be ordered using Mastercard or Visa at (202) 783-3238.

11. Flight Operations in Volcanic Ash

11.1 Severe volcanic eruptions which send ash into the upper atmosphere occur somewhere around the world several times each year. Flying into a volcanic ash cloud can be exceedingly dangerous. A B747-200 lost all four engines after such an encounter and a B747-400 had the same nearly catastrophic experience. Piston-powered aircraft are less likely to lose power but severe damage is almost certain to ensue after an encounter with a volcanic ash cloud which is only a few hours old.

11.2 Most important is to avoid any encounter with volcanic ash. The ash plume may not be visible, especially in instrument conditions or at night; and even if visible, it is difficult to distinguish visually between an ash cloud and an ordinary weather cloud. Volcanic ash clouds are **not** displayed on airborne or ATC radar. The pilot must rely on reports from air traffic controllers and other pilots to determine the location of the ash cloud and use that information to remain well clear of the area. Every attempt should be made to remain on the upwind side of the volcano.

11.3 It is recommended that pilots encountering an ash cloud should immediately reduce thrust to idle (altitude permitting), and reverse course in order to escape from the cloud. Ash clouds may extend for hundreds of miles and pilots should not attempt to fly through or climb out of the cloud. In addition, the following procedures are recommended:

a. Disengage the autothrottle if engaged. This will prevent the autothrottle from increasing engine thrust;

b. Turn on continuous ignition;

c. Turn on all accessory airbleeds including all air conditioning packs, nacelles, and wing anti-ice. This will provide an additional engine stall margin by reducing engine pressure.

11.4 The following has been reported by flightcrews who have experienced encounters with volcanic dust clouds:

a. Smoke or dust appearing in the cockpit;

b. An acrid odor similar to electrical smoke;

c. Multiple engine malfunctions, such as compressor stalls, increasing EGT, torching from tailpipe, and flameouts;

d. At night, St. Elmo's fire or other static discharges accompanied by a bright orange glow in the engine inlets;

e. A fire warning in the forward cargo area.

11.5 It may become necessary to shut down and then restart engines to prevent exceeding EGT limits. Volcanic ash may block the pitot system and result in unreliable airspeed indications.

11.6 If you see a volcanic eruption and have not been previously notified of it, you may have been the first person to observe it. In this case, immediately contact ATC and alert them to the existence of the eruption. Do not become unnecessarily alarmed if there is merely steam or very low-level eruptions of ash.

12. EMERGENCY AIRBORNE INSPECTION OF OTHER AIRCRAFT

12.1 Providing airborne assistance to another aircraft may involve flying in very close proximity to that aircraft. Most pilots receive little, if any, formal training or instruction in this type of flying activity. Close proximity flying without sufficient time to plan (i.e., in an emergency situation), coupled with the stress involved in a perceived emergency can be hazardous.

12.2 The pilot in the best position to assess the situation should take the responsibility of coordinating the airborne intercept and inspection, and take into account the unique flight characteristics and differences of the category(s) of aircraft involved.

12.3 Some of the safety considerations are:

a. Area, direction and speed of the intercept;

b. Aerodynamic effects (i.e., rotorcraft downwash) which may also affect;

c. Minimum safe separation distances;

d. Communications requirements, lost communications procedures, coordination with ATC;

e. Suitability of diverting the distressed aircraft to the nearest safe airport; and

f. Emergency actions to terminate the intercept.

12.4 Close proximity, in-flight inspection of another aircraft is uniquely hazardous. The pilot in command of the aircraft experiencing the problem/emergency must not relinquish his/her control of the situation and jeopardize the safety of his/her aircraft. The maneuver must be accomplished with minimum risk to both aircraft.

TWO-WAY RADIO COMMUNICATIONS FAILURE

1. TWO-WAY RADIO COMMUNICATIONS FAILURE

1.1. It is virtually impossible to provide regulations and procedures applicable to all possible situations associated with two-way radio communications failure. During two-way radio communications failure when confronted by a situation not covered in the regulation, pilots are expected to exercise good judgment in whatever action they elect to take. Should the situation so dictate, they should not be reluctant to use the emergency action contained in FAR 91.3(b).

1.2. Whether two-way communications failure constitutes an emergency depends on the circumstances, and in any event is a determination made by the pilot. FAR 91.3 authorizes a pilot to deviate from any rule to the extent required to meet an emergency.

1.3. In the event of two-way radio communications failure, ATC service will be provided on the basis that the pilot is operating in accordance with FAR 91.185. A pilot experiencing two-way communications failure should (unless emergency authority is exercised) comply with FAR 91.185 as indicated below.

1.4 Unless otherwise authorized by ATC, each pilot who has two-way radio communications failure when operating under IFR shall comply with the following conditions.

1.4.1 If the failure occurs in VFR conditions, or if VFR conditions are encountered after the failure, each pilot shall continue the flight under VFR and land as soon as practicable. This procedure also applies when two-way radio failure occurs while operating in Class A Airspace. The primary objective of this provision in FAR 91.185 is to preclude extended IFR operations in the air traffic control system in VFR weather conditions. Pilots should recognize that operation under these conditions may unnecessarily as well as adversely affect other users of the airspace, since ATC may be required to reroute or delay other users in order to protect the failure aircraft. However, it is not intended that the requirement to "land as soon as practicable" be construed to mean "as soon as possible." The pilot retains his prerogative of exercising his best judgment and is not required to land at an unauthorized airport, at an airport unsuitable for the type of aircraft flown, or to land only minutes short of his destination.

1.4.2 If the failure occurs in IFR conditions, or if VFR conditions cannot be complied with, each pilot shall continue the flight according to the following requirements.

1.4.2.1 Route requirements;

(a) By the route assigned in the last ATC clearance received;

(b) If being radar vectored, by the direct route from the point of radio failure to the fix, route, or airway specified in the vector clearance;

(c) In the absence of an assigned route, by the route that ATC has advised may be expected in a further clearance; or

(d) In the absence of an assigned route or a route that ATC has advised may be expected in a further clearance, by the route filed in the flight plan.

1.4.2.2 Altitude requirements. At the HIGHEST of the following altitudes or flight levels FOR THE ROUTE SEGMENT BEING FLOWN:

(a) The altitude or flight level assigned in the last ATC clearance received;

(b) The minimum altitude (converted, if appropriate, to minimum flight level as prescribed in 91.121(c)) for IFR operations; or

(c) The altitude or flight level ATC has advised may be expected in a further clearance.

NOTE– The intent of the rule is that a pilot who has experienced two-way radio failure should select the appropriate altitude for the particular route segment being flown and make the necessary altitude adjustments for subsequent route segments. If the pilot received an "expect further clearance" containing a higher altitude to expect at a specified time or fix, he/she should maintain the highest of the following altitudes until that time/fix: (1) His/her last assigned altitude, or (2) The minimum altitude/flight level for IFR operations.

Upon reaching the time/fix specified, the pilot should commence his/her climb to the altitude he/she was advised to expect. If the radio failure occurs after the time/fix specified, the altitude to be expected is not applicable and the pilot should maintain an altitude consistent with 1 or 2 above.

If the pilot receives an "expect further clearance" containing a lower altitude, the pilot should maintain the highest of 1 or 2 above until that time/fix specified in SAR-3, paragraph 1.4.2.3.

Example:

A pilot experiencing two-way radio failure at an assigned altitude of 7,000 feet is cleared along a direct route which will require a climb to a minimum IFR altitude of 9,000 feet, should climb to reach 9,000 feet at the time or place where it becomes necessary (see FAR 91.177(b)). Later while proceeding along an airway with an MEA of 5,000 feet, the pilot would descend to *7,000 feet* (the last assigned altitude), because that altitude is *higher* than the MEA.

Example:

A pilot experiencing two-way radio failure while being progressively descended to lower altitudes to begin an approach is assigned 2,700 feet until crossing the VOR and then cleared for the approach. The MOCA along the airway is 2,700 feet and MEA is 4,000 feet. The aircraft is within 22 NM of the VOR. The pilot should remain at 2,700 feet until crossing the VOR because that altitude is the minimum IFR altitude for the route segment being flown.

Example:

The MEA between **A** and **B** -5,000 feet. The MEA between **B** and **C** -5,000 feet. The MEA between **C** and **D** -11,000 feet. The MEA between **D** and **E** -7,000 feet. A pilot had been cleared via **A, B, C, D,** to **E.** While flying between A and B his assigned altitude was 6,000 feet and he was told to expect a clearance to 8,000 feet at **B.** Prior to receiving the higher altitude assignment, he experienced two-way failure. The pilot would maintain 6,000 to **B**, then climb to 8,000 feet (the altitude he was advised to expect.) He would maintain 8,000 feet, then climb to 11,000 at **C**, or prior to **C** if necessary to comply with an MCA at **C.** FAR 91.177(b). Upon reaching **D,** the pilot would descend to *8,000 feet* (even though the MEA was 7,000 feet), as 8,000 was the highest of the altitude situations stated in the rule FAR 91.185.

1.4.2.3 *Leave Clearance Limit*

1.4.2.3.1 When the clearance limit is a fix from which an approach begins, commence descent or descent and approach as close as possible to the expect further clearance time if one has been received, or if one has not been received, as close as possible to the estimated time of arrival as calculated from the filed or amended (with ATC) estimated time en route.

1.4.2.3.2 If the clearance limit is not a fix from which an approach begins, leave the clearance limit at the expect further clearance time if one has been received, or if none has been received, upon arrival over the clearance limit, and proceed to a fix from which an approach begins and commence descent or descent and approach as close as possible to the estimated time of arrival as calculated from the filed or amended (with ATC) estimated time en route.

2. TRANSPONDER OPERATION DURING TWO — WAY COMMUNICATIONS FAILURE

2.1 If an aircraft with a coded radar beacon transponder experiences a loss of two—way radio capability, the pilot should adjust the transponder to reply on Mode 3/A, Code 7600.

2.2 The pilot should understand that he may not be in an area of radar coverage.

3. REESTABLISHING RADIO CONTACT

3.1 In addition to monitoring the NAVAID voice feature, the pilot should attempt to reestablish communications by attempting contact:

a. on the previously assigned frequency

b. with an FSS or ARINC.

3.2 If communications are established with an FSS or ARINC, the pilot should advise the aircraft's position, altitude, last assigned frequency and then request further clearance from the controlling facility. The preceding does not preclude the use of 121.5 MHz. There is no priority on which action should be attempted first. If the capability exists, do all at the same time.

Note — AERONAUTICAL RADIO/INCORPORATED (ARINC) is a commercial communications corporation which designs, constructs, operates, leases or otherwise engages in radio activities serving the aviation community. ARINC has the capability of relaying information to/from ATC facilities throughout the country.

AERONAUTICAL CHARTS

1. GENERAL

Aeronautical charts for the United States and its territories and possessions are produced by the National Ocean Service, a part of the Department of Commerce, from information furnished by the Federal Aviation Administration.

1.1 Obtaining Civil Aeronautical Charts

Enroute Aeronautical Charts, Terminal Procedure Publication Charts, Regional Airport/Facility Directories and other publications described in this Section are available upon subscription and one time sales from:

NOAA Distribution Branch (N/CG33)
National Ocean Service
Riverdale, Maryland 20737-1199
Phone: (301) 436-6990

Charts may also be purchased directly from authorized NOS chart agents who are located worldwide. A listing of these chart agents may be found in the back of the NOS' Aeronautical Charts and Related Products free catalog. Many fixed base operators are NOS chart agents.

2. APPLICABLE ICAO DOCUMENTS

The aeronautical charts are produced as far as possible in accordance with the specifications contained in the following ICAO documents:

Annex 4, Aeronautical Charts
Doc 8168-OPS/611, Aircraft Operations (Holding Patterns, OCL and Instrument Approach Procedures)

3. DIFFERENCES FROM ICAO STANDARDS AND RECOMMENDED PRACTICES

See AIP section DIF.

4. A FEW OF THE CHARTS AND PRODUCTS THAT ARE AVAILABLE

Sectional and VFR Terminal Area Charts
World Aeronautical Charts (U.S.)
Enroute Low, High, and Alaska
Oceanic Planning Charts
Terminal Procedures Publication (TPP)
Alaska Terminal Publication
Helicopter Route Charts
Airport Facility Directory
Supplement Alaska & Chart Supplement Pacific

5. GENERAL DESCRIPTION OF EACH SERIES

5.1 Sectional and VFR Terminal Area Charts

These charts are designed for visual navigation of slow and medium speed aircraft. They are produced to the following scales:

Sectional Charts—1:500,000 (1 in=6.86 NM)
VFR Terminal Area Charts—1:250,000 (1 in=3.43 NM)

Topographic information features the portrayal of relief and a judicious selection of visual check points for VFR flight (Terminal Area Charts include populated places, drainage, roads, railroads, and other distinctive landmarks). Aeronautical information includes visual and radio aids to navigation, aerodromes, Class B, C, D, and E Airspace, restricted areas, obstructions and related data. The VFR Terminal Area Charts also depict the airspace designated as "Class B Airspace" which provides for the control or segregation of all aircraft within the Class B Airspace. The Puerto Rico-Virgin Islands Terminal Area Chart contains basically the same information as that shown on the Sectional and Terminal Area Chart. It includes the Gulf of Mexico and Caribbean Planning Chart on the reverse side (See PLANNING CHARTS). Charts are revised semi-annually except several Alaskan Sectionals and the Puerto Rico-Virgin Islands Terminal Area which are revised annually.

5.2 World Aeronautical Charts

These charts are designed to provide a standard series of aeronautical charts, covering land areas of the world, at a size and scale convenient for navigation by moderate speed aircraft. They are produced at a scale of 1:1,000,000 (1 in=13.7 NM). Topographic information includes cities and towns, principal roads, railroads, distinctive landmarks, drainage and relief. The latter is shown by spot elevations, contours, and gradient tints. Aeronautical information includes visual and radio aids to navigation, aerodromes, airways, restricted areas, obstructions and other pertinent data. These charts are revised annually except several Alaskan charts and the Mexican/Caribbean charts, which are revised every two years.

5.3 En route Low Altitude Charts

These charts are designed to provide aeronautical information for en route navigation under Instrument Flight Rules (IFR) in the low altitude stratum. This series includes en route Area Charts which furnish terminal data at a large scale in congested areas, and is included with the subscription to the series. Information includes the portrayal of L/MF and VHF airways; limits of Class B, C, D, and E Airspace; position, identification and frequencies of radio aids; selected aerodromes; minimum en route and obstruction clearance altitudes; airway distances; rèporting points; special use airspace areas; Military Training Routes and related information. Charts are printed back to back. Charts are revised every 56 days effective with the date of airspace changes. An En route Change Notice may be issued as required.

5.4 En route High Altitude Charts

These charts are designed to provide aeronautical information for en route navigation under Instrument Flight Rules (IFR) in the high altitude stratum. Information includes the portrayal of jet routes; position, identification and frequencies of radio aids; selected aerodromes; distances; time zones; special use airspace areas and related information. Charts are revised every 56 days effective with the date of airspace changes. An En route Change Notice may be issued as required.

5.5 Alaska En route Charts (Low and High)

These charts are produced in a low altitude and high altitude series with purpose and makeup identical to Low and High altitude charts described above. Charts are revised every 56 days effective with the date of airspace changes. An En route Change Notice may be issued as required.

5.6 Charted VFR Flyway Planning Chart

These charts are designed to identify flight paths clear of the major controlled traffic flows. The program is intended to provide charts showing multiple VFR routings through high density traffic areas which may be used as an alternative to flight within Class B Airspace. Ground references are provided as guides for improved visual navigation. These charts are not intended to discourage VFR operations within the Class B Airspace, but are designed for information and planning purposes. They are produced at a scale of 1:250,000 (1 in = 3.43 NM). These charts are revised semi-annually and are published on the back of the existing VFR Terminal Area Charts.

5.7 Planning Charts

5.7.1 *Gulf of Mexico and Caribbean Planning Chart*

This chart is designed for preflight planning for VFR flights. It is produced at a scale of 1:6,270,551 (1 in=86 NM). This chart is on the reverse of the Puerto Rico-Virgin Islands Terminal Area Chart. Information includes mileage between Airports of Entry, a selection of special use airspace areas and a Directory of Aerodromes with their available facilities and servicing.

5.7.2 *North Atlantic Route Chart*

This five-color chart is designed for use of Air Traffic Controllers in monitoring transatlantic flights and for FAA planners. Oceanic controlled airspace, coastal navigation aids, major coastal airports, and oceanic reporting points are depicted. Geographic coordinates for NAVIDS and reporting points are included. The chart may be used for preflight and in-flight planning. This chart is revised each 24 weeks. Chart available in two sizes, scale: full size 1:5,500,000, 58 by 41 inches/half size 1:11,000,000, 29 by 20 1/2 inches.

5.7.3 *North Pacific Oceanic Route Chart*

This chart series, like the North Atlantic Route Chart series, is designed for FAA Air Traffic Controllers' use in monitoring transoceanic air traffic. Charts are available in two scales: 1:12,000,000 composite small scale planning chart, which covers the entire North Pacific and four 1:7,000,000 Area Charts. They are revised every 56 days. The charts are available unfoled, flat only and contain esrtablished intercontinental air routes including all reporting points with geographic positions.

5.8 Terminal Procedures Publication (TPP)

This publication contains charts depicting Instrument Approach Procedures (IAP), Standard Terminal Arrivals (STAR), and Standard Instrument Departures (SID).

5.8.1 *Instrument Approach Procedure (IAP) Charts*

IAP charts portray the aeronautical data which is required to execute instrument approaches to airports. Each chart depicts the IAP, all related navigation data, communications information, and an airport sketch. Each procedure is designated for use with a specific electronic navigational aid, such as ILS, VOR, NDB, RNAV, etc. Airport Diagram Charts, where published, are included.

5.8.2 *Standard Instrument Departure (SID) Charts*

These charts are designed to expedite clearance delivery and to facilitate transition between takeoff and en route operations. They furnish pilots departure routing clearance information in graphic and textual form.

5.8.3 *Standard Terminal Arrival (STAR) Charts*

These charts are designed to expedite ATC arrival procedures and to facilitate transition between en route and instrument approach operations. They present to the pilot preplanned IFR ATC arrival procedures in graphic and textual form. Each STAR procedure is presented as a separate chart and may serve a single airport or more than one airport in a given geographic location.

These charts are published in 16 bound volumes covering the conterminous U.S. and the Puerto Rico-Virgin Islands. Each volume is superseded by a new volume each 56 days. Changes to procedures occurring between the 56-day publication cycle is reflected in a Change Notice volume, issued on the 28-day midcycle. These changes are in the form of a new chart. The publication of a new 56-day volume incorporates all the changes and replaces the preceding volume and the change notice. The volumes are 5⅜ x 8¼ inches and are bound on the top edge.

5.9 Alaska Terminal Publication

This publication contains charts depicting all terminal flight procedures in the State of Alaska for civil and military aviation. They are:

- Instrument Approach Procedure (IAP) Charts.
- Standard Instrument Departure (SID) Charts
- Standard Terminal Arrival Route (STAR) Charts
- Airport Diagram Charts
- Radar Minimums

All supplementary supporting data, i.e.; IFR Takeoff and Departure Procedures, IFR Alternate Minimums, Rate of Descent Table, Inoperative Components Table, etc., is also included.

The Alaska Terminal is published in a bound book 5¼" x 8¼". The publication is issued every 56 days with provisions for an as required "Terminal Change" on the 28 day midpoint.

5.10 Helicopter Route Charts

5.10.1 Prepared under the auspices of the FAA Helicopter Route Chart Program, these charts enhance helicopter operator access into, egress from, and operations within selected high density traffic areas. The scale is 1:125,000; however, some include smaller scale insets. Graphic information includes urban tint, principal roads, pictorial symbols, and spot elevations. Aeronautical information includes routes, operating zones, altitudes or flight ceilings/bases, heliports, helipads, NAVAID's, special use airspace, selected obstacles, ATC and traffic advisory radio communications frequencies, Class B surface area tint, and other important flight aids. These charts are revised when significant aeronautical information changes and/or safety related events occur. Historically, new editions are published about every 2 years. See the "Dates of Latest Editions" for current editions.

5.10.2 Air traffic facility managers are responsible for determining the need for new chart development or existing chart revision. Therefore, requests for new charts or revisions to existing charts should be directed to these managers. Guidance pertinent to mandatory chart features and managerial evaluation of requests is contained in FAA Order 7210.3, Facility Operation and Administration.

6. RELATED PUBLICATIONS

6.1 The Airport Facility Directory

This directory is issued in seven volumes with each volume covering a specific geographic area of the conterminous U.S., including Puerto Rico and the U.S. Virgin Islands. The directory is 5⅜ x 8¼ inches and is bound on the side. Each volume is reissued in its entirety each 56 days. Each volume is indexed alphabetically by state, airport, navigational aid, and ATC facility for the area of coverage. All pertinent information concerning each entry is included.

6.2 Alaska Supplement

This supplement is a joint Civil/Military Flight Information Publication (FLIP), published and distributed every 56 days by the National Ocean Service. It is designed for use with the Flight Information Publication En route Charts, Alaska Terminal, WAC and Sectional Aeronautical Charts. This Supplement contains an Aerodrome/Facility Directory of all aerodromes shown on En route Charts, and those requested by appropriate agencies, communications data, navigational facilities, special notices and procedures applicable to the area of chart coverage.

6.3 Pacific Supplement

This Chart Supplement is a Civil Flight Information Publication, published and distributed every 56 days by the National Ocean Service. It is designed for use with the Flight Information En route Publication Charts and the Sectional Aeronautical Chart covering the State of Hawaii and that area of the Pacific served by U.S. facilities. An Amendment Notice is published 4 weeks after each issue of the Supplement. This chart Supplement contains an Aerodrome/Facility Directory of all aerodromes open to the public, and those requested by appropriate agencies, communications data, navigational facilites, special notices and procedures applicable to the Pacific area.

6.4 Digital Aeronautical Chart Supplement (DACS)

The DACS is a subset of the data NOAA provides to FAA controllers every 56 days. It reflects digitally exactly what is shown on the En Route and Air Traffic Controller Charts. The DACS is designed to assist with flight planning and should not be considered a substitute for a chart. The supplement comes in either a 3.5'' or 5.25'' diskette compressed format. The supplement is divided into nine individual sections. They are:

Section 1: High Altitude Airways—Conterminous U.S.
Section 2: Low Altitude Airways—Conterminous U.S.
Section 3: Selected Instrument Approach Procedure NAVAID and FIX Data
Section 4: Military Training Routes
Section 5: Alaska, Hawaii, Puerto Rico, Bahama and Selected Oceanic Routes
Section 6: STAR's-Standard Terminal Arrivals and Profile Descent Procedures
Section 7: SID's-Standard Instrument Departures
Section 8: Preferred IFR Routes (Low and High Altitudes)
Section 9: Air Route and Airport Surveillance Radar Facilities (updated yearly)

Section 3 has a Change Notice that will be issued at the mid-28 day point. Contains changes that occured after the 56 day publication. Sections 8 and 9 are not digital products, but contain pertinent air route data associated with the other sections.

6.5 NOAA Aeronautical Chart User's Guide

This guide is designed to be used as a teaching aid, reference document, and an introduction to the wealth of information provided on NOAA's aeronautical charts and publications. The guide includes discussion of IFR chart terms and symbols.

6.6 Defense Mapping Agency Aerospace Center (DMAAC) Publications

Defense Mapping Agency Aeronautical Charts and Products are available prepaid from:

DIRECTOR
DMA Combat Support Center
Attention: PMSR
Washington, DC 20315-0010
Phone: CONUS Toll free telephone number 1-800-826-0342

Pilotage Charts (PC/TPC)—Sacle 1:500,000 used for detail preflight planning and mission analysis. Emphasis in design is on ground features significant in visual and radar, low-level high speed navigation.

Jet Navigation Charts (JNC-A)—Scale 1:3,000,000. Designed to provide greater coverage than the 1:2,000,000 scale Jet Navigation Charts described below. Uses include preflight planning and en route navigation by long range jet aircraft with dead reckoning, radar, celestial and grid navigation capabilities.

LORAN Navigation & Consol LORAN Navigation Charts (LJC/CJC)—Scale 1:2,000,000. Used for preflight planning and inflight navigation on long- range flights in the Polar areas and adjacent regions utilizing LORAN and CONSOL navigation aids.

Continental Entry Chart (CEC)—Scale 1:2,000,000. Used for CONSOLAN and LORAN navigation for entry into the United States when a high degree of accuracy is required to comply with Air Defense identification and reporting procedures. Also suitable as a basic dead reckoning sheet and for celestial navigation.

Aerospace Planning Chart (ASC)—Scales 1:9,000,000 and 1:18,000,000. Six charts at each scale and with various projections cover the world. Charts are useful for general planning, briefings and studies.

Air Distance/Geography Chart (GH-2, 2a)—Scales 1:25,000,000 and 1:50,000,000. This chart shows great circle distances between major airports. It also shows major cities, international boundaries, shaded relief and gradient tints.

LORAN C Navigation Chart (LCC)—Scale 1:3,000,000. Primarily designed for preflight and in-flight long-range navigation where LORAN C is used as the basic navigation aid.

DOD Weather Plotting Chart (WPC)—Various scales. Designed as nonnavigational outline charts which depict locations and identifications of meteorological observing stations. Primarily used to forecast and monitor weather and atmospheric conditions throughout the world.

Flight Information Publications (FLIP)—These include Enroute Low Altitude and High Altitude Charts, Enroute Supplements, Terminal (Instrument Approach) Charts, and other information publications for various areas of the world.

"Note: FLIP. Terminal publications do not necessarily include all instrument approach procedures for all airports. They include only those required for military operations."

World Aeronautical (WAC) and Operational Navigation Charts (ONC)—The Operational Navigation Charts (ONC) have the same purpose and contain essentially the same information as the WAC series except the terrain is portrayed by shaded relief as well as contours. The ONC series is replacing the WAC series and the WAC's will be available only where the ONC's have not been issued. ONC's are 42 x 57½ inches, WAC's are 22 x 30 inches. These charts are revised on a regular schedule.

Jet Navigation Charts—These charts are designed to provide charts suitable for long range, high altitude, high speed navigation. They are produced at a scale of 1:2,000,000 (1 in=27.4 NM). Topographic features include large cities, roads, railroads, drainage, and relief. The latter is indicated by contours, spot elevations, and gradient tints. All aeronautical information necessary to conform to the purpose of the chart is shown. This includes restricted areas, L/MF and VOR ranges, radiobeacons, and a selection of standard broadcasting stations and aerodromes. The runway patterns of the aerodromes are shown to exaggerated scale in order that they may be readily identified as visual landmarks. Universal Jet Navigation Charts are used as plotting charts in training and practice of celestial and dead reckoning navigation. They may also be used for grid navigational training.

Global Navigational Charts—These charts are designed to provide charts suitable for aeronautical planning, operations over long distances, and en route navigation in long range, high altitude, high speed aircraft. They are produced at a scale of 1:5,000,000 (1 in=68.58 NM). Global Navigation Charts (GNC) are 42 by 57½ inches. They show principal cities, towns and drainage, primary roads and railroads, prominent culture and shadient relief augmented with tints and spot elevations. Aeronautical data includes radio aids to navigation, aerodrome and restricted areas. Charts 1 and 26 have a polar navigation grid and charts 2 and 6 have sub-polar navigation grids. Global LORAN Navigation Charts (GLC) are the same size and scale and cover the same area as the GNC charts. They contain major cities only, coast lines, major lakes and rivers, and land tint. No relief or vegetation. Aeronautical Data includes radio aids to navigation and LORAN lines of position.

7. AUXILIARY CHARTS

7.1 *Airport Obstruction Charts (OC):*

The Airport Obstruction Chart is a 1:12,000 scale graphic depicting FAR Part 77 surfaces, a representation of objects that penetrate these surfaces, aircraft movement and apron areas, navigational aids, prominent airport buildings, and a selection of roads and other planimetric detail in the airport vicinity. Also included are tabulations of runway and other operational data.

7.2 *Military Training Routes:*

Charts and Booklet: The Defense Mapping Agency Aerospace Center (DMAAC) publishes a narrative description in booklet form and charts depicting the Military Training Routes.

The charts and booklet are published every 8 weeks. Both the charts and narrative route description booklet are available to the general public as a brochure by single copy or annual subscription. Subscription and single-copy requests should be for the "DOD Area Planning AP/1B, Military Training Routes". (See RAC-5;7.5 - MILITARY TRAINING ROUTES (MTR).)

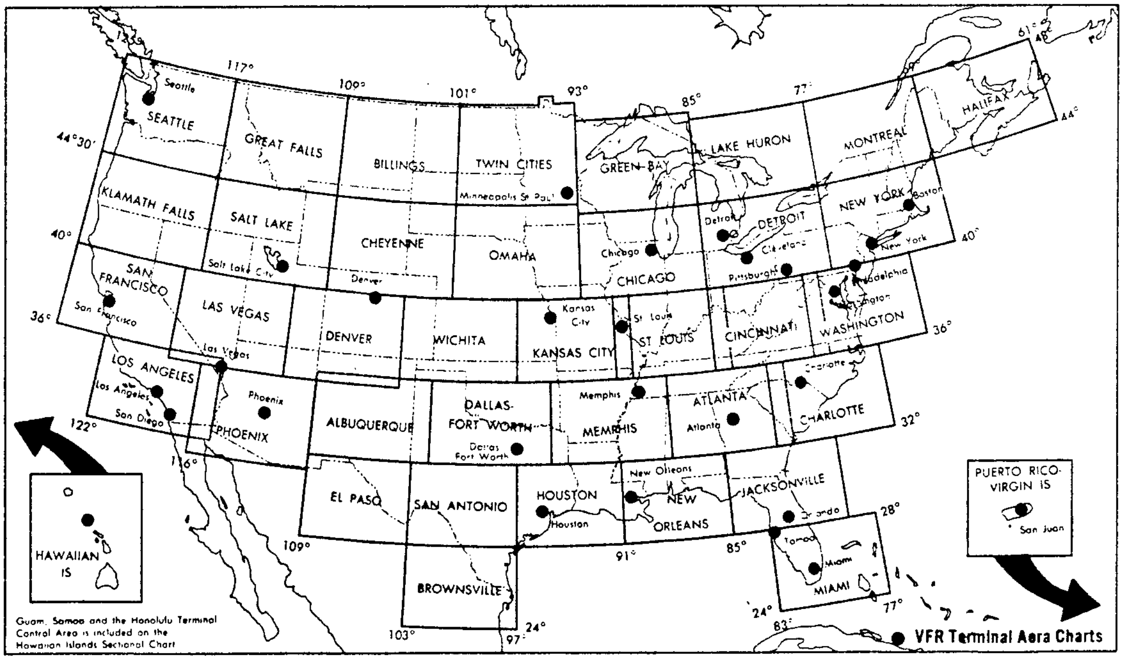
Note: The Department of Defense provides these booklets and charts to each Flight Service Station for use in preflight pilot briefings. Pilots should review this information to acquaint themselves with those routes that are located along their route of flight and in the vicintiy of the airports from which they operate.

LISTING OF CHART SERIES

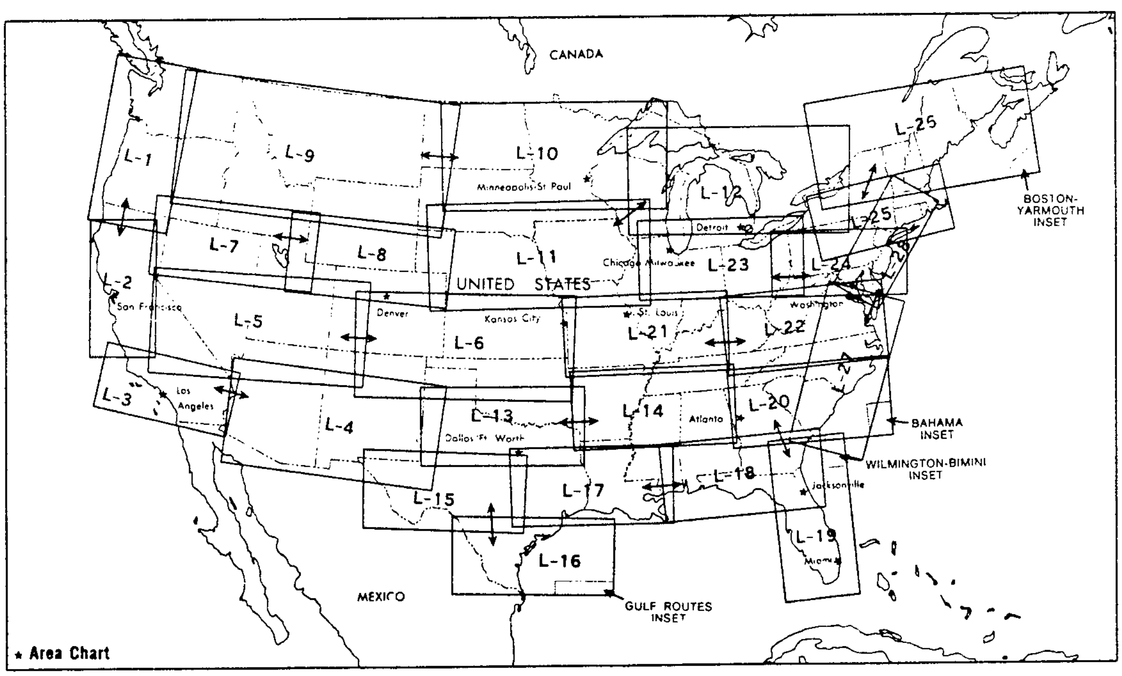
1. General

A listing of current Charts and charts contained in a chart series is provided by the National Ocean Service (NOS) with subscription. A listing, without subscription, may be obtained upon request from the NOS. (See AIP section Gen for address).

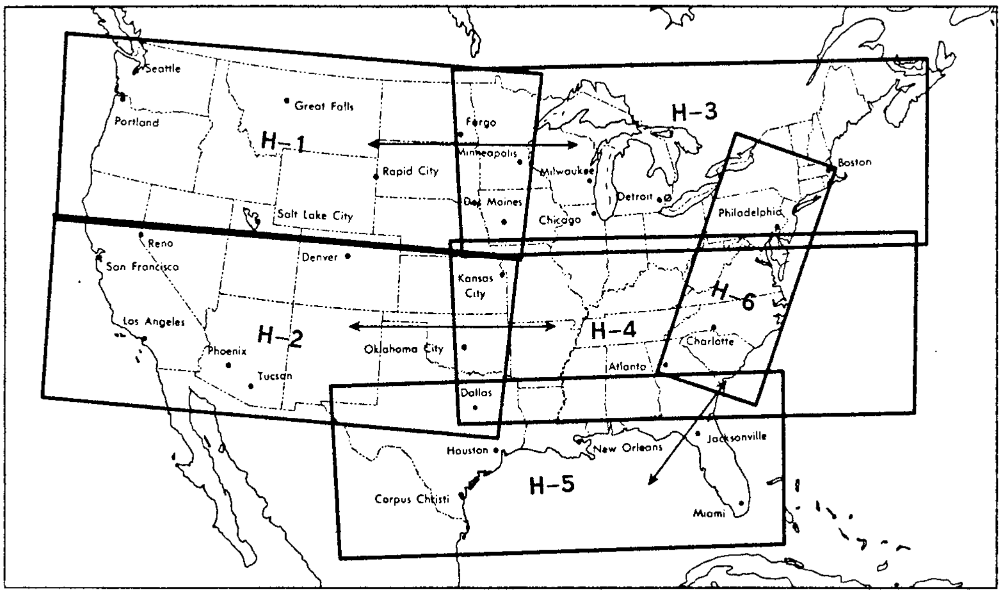
SECTIONAL AND VFR TERMINAL AREA CHARTS FOR THE CONTERMINOUS UNITED STATES, HAWAIIAN ISLANDS, PUERTO RICO AND THE VIRGIN ISLANDS



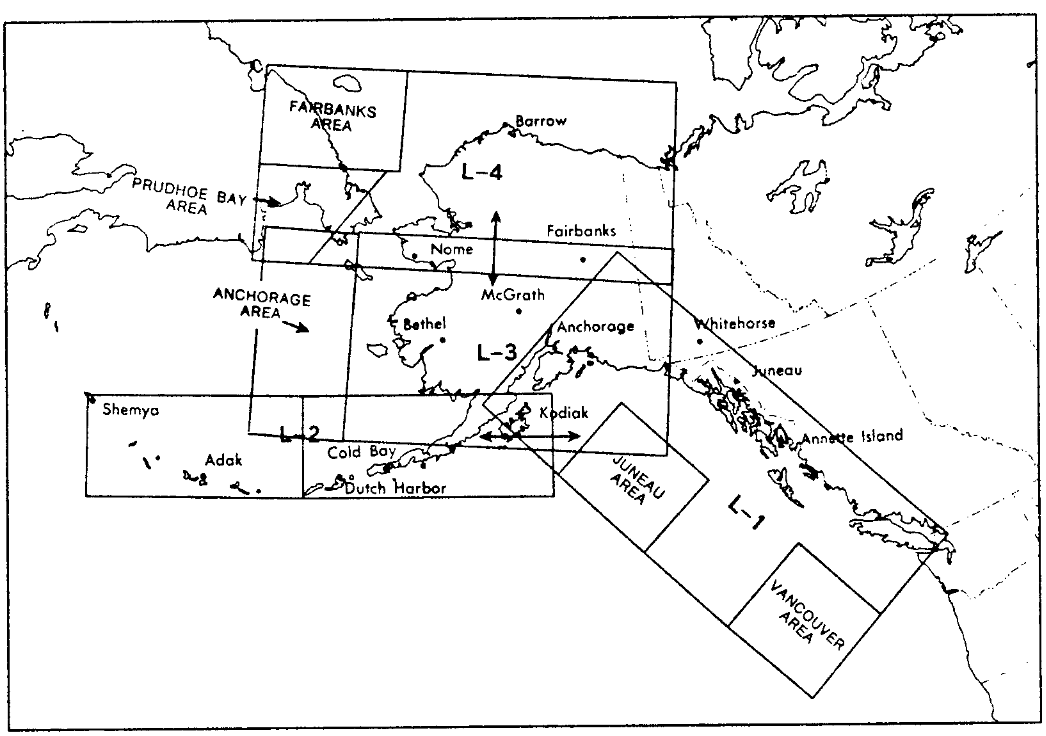
ENROUTE LOW ALTITUDE INSTRUMENT CHARTS FOR THE CONTERMINOUS U.S. (INCLUDES AREA CHARTS)



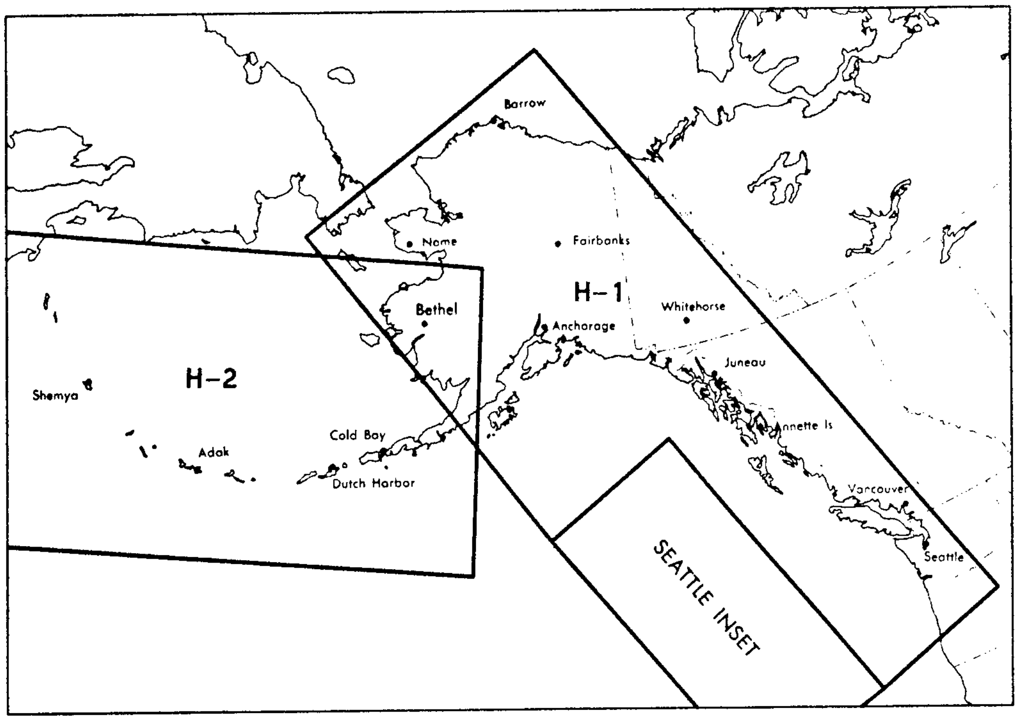
ENROUTE HIGH ALTITUDE CHARTS FOR THE CONTERMINOUS U. S.



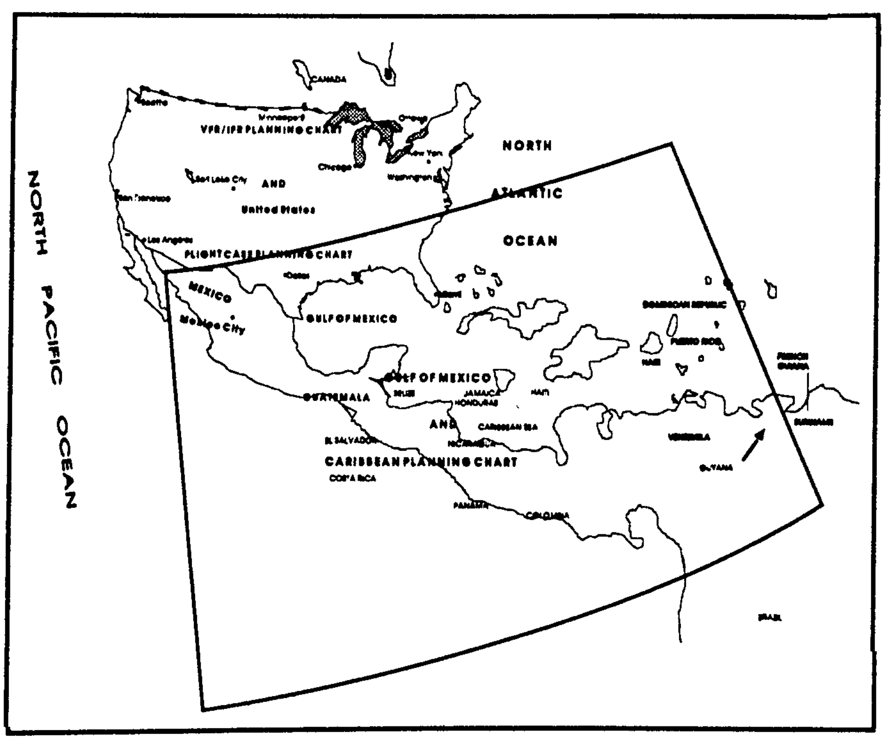
ALASKA ENROUTE LOW ALTITUDE CHART



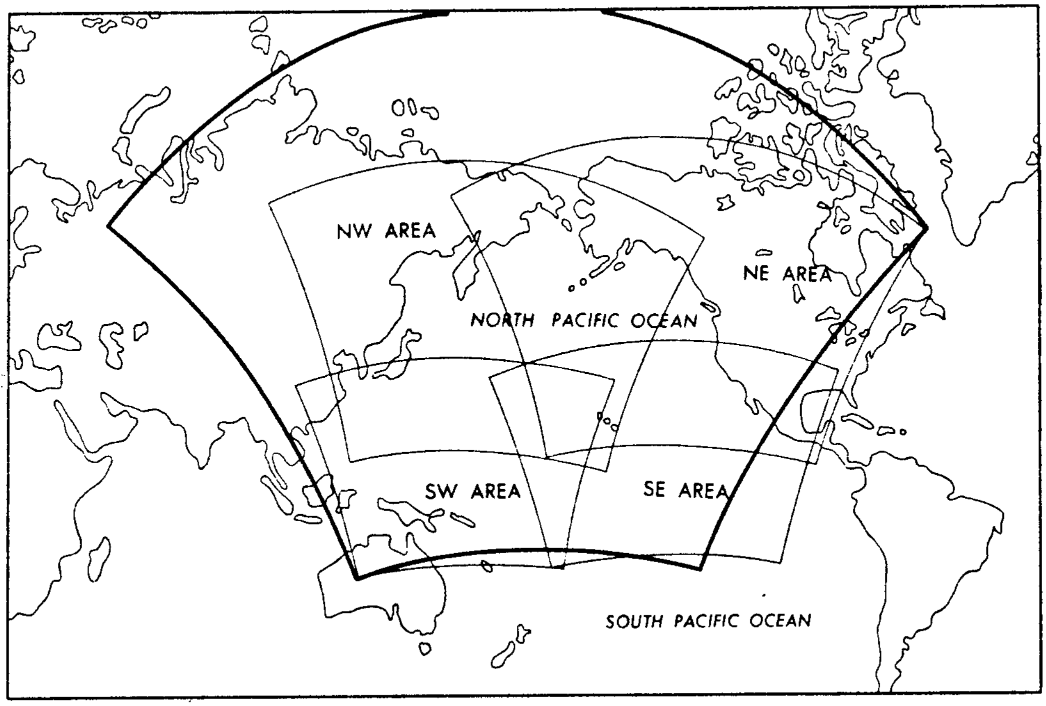
ALASKA ENROUTE HIGH ALTITUDE CHART



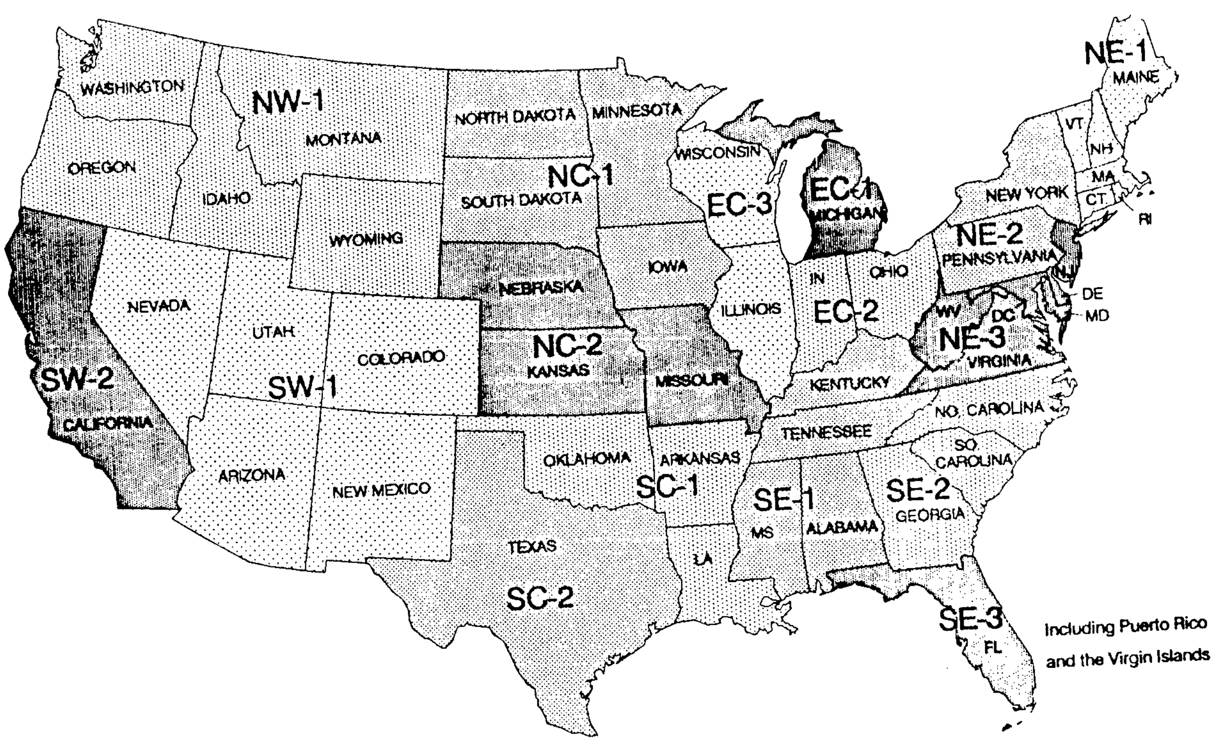
GULF OF MEXICO AND CARIBBEAN PLANNING CHART



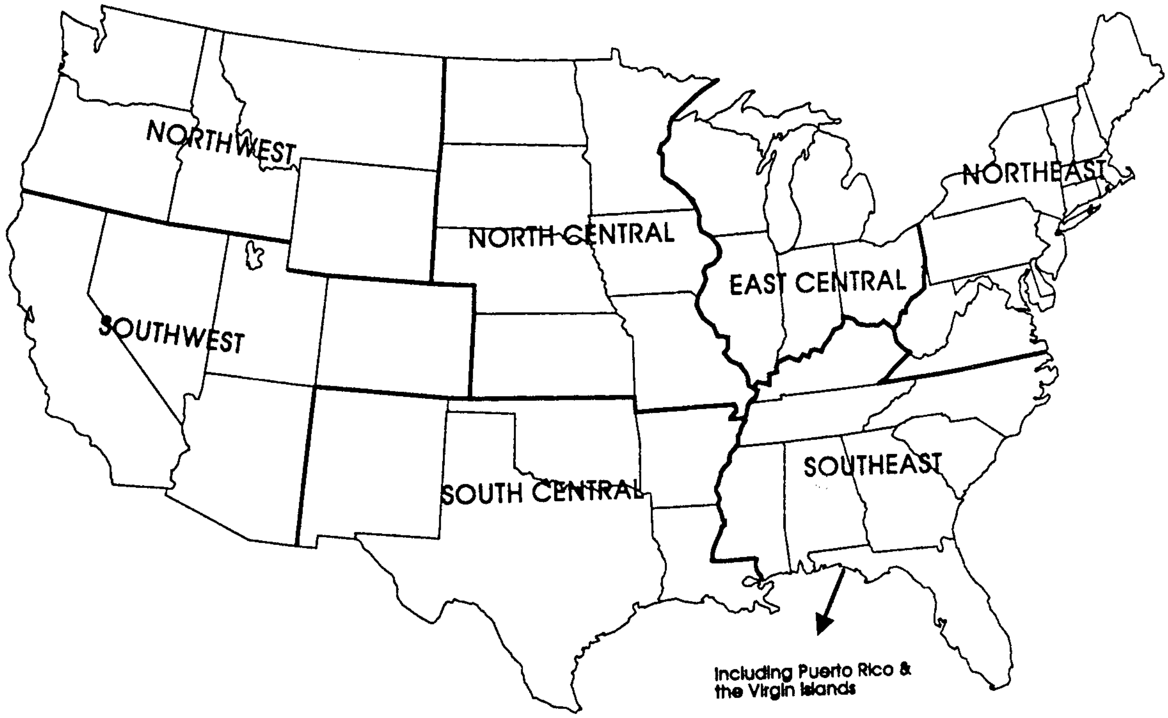
NORTH PACIFIC ROUTE CHARTS



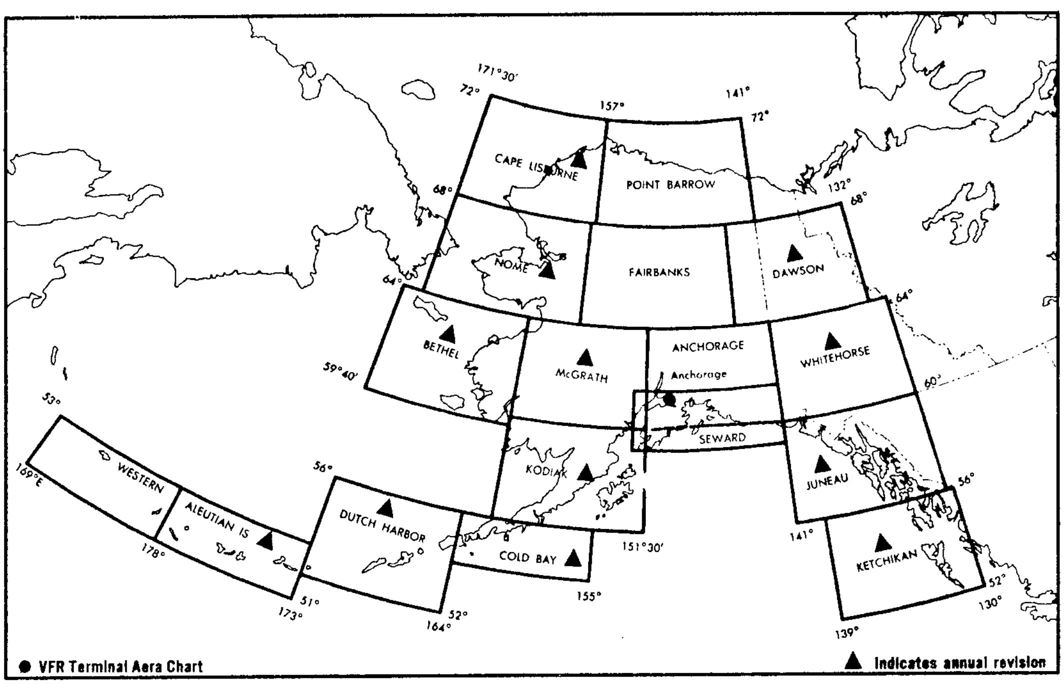
U.S. TERMINAL PUBLICATION VOLUMES



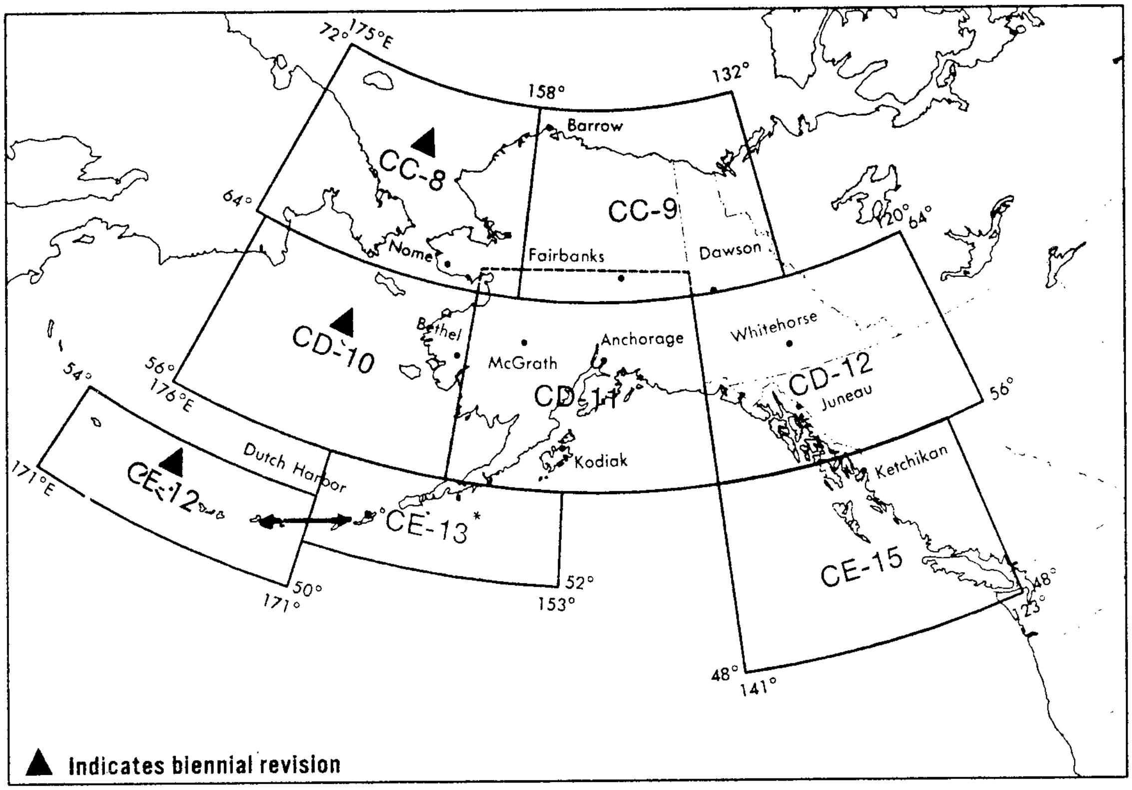
AIRPORT/FACILITY DIRECTORY GEOGRAPHIC AREAS



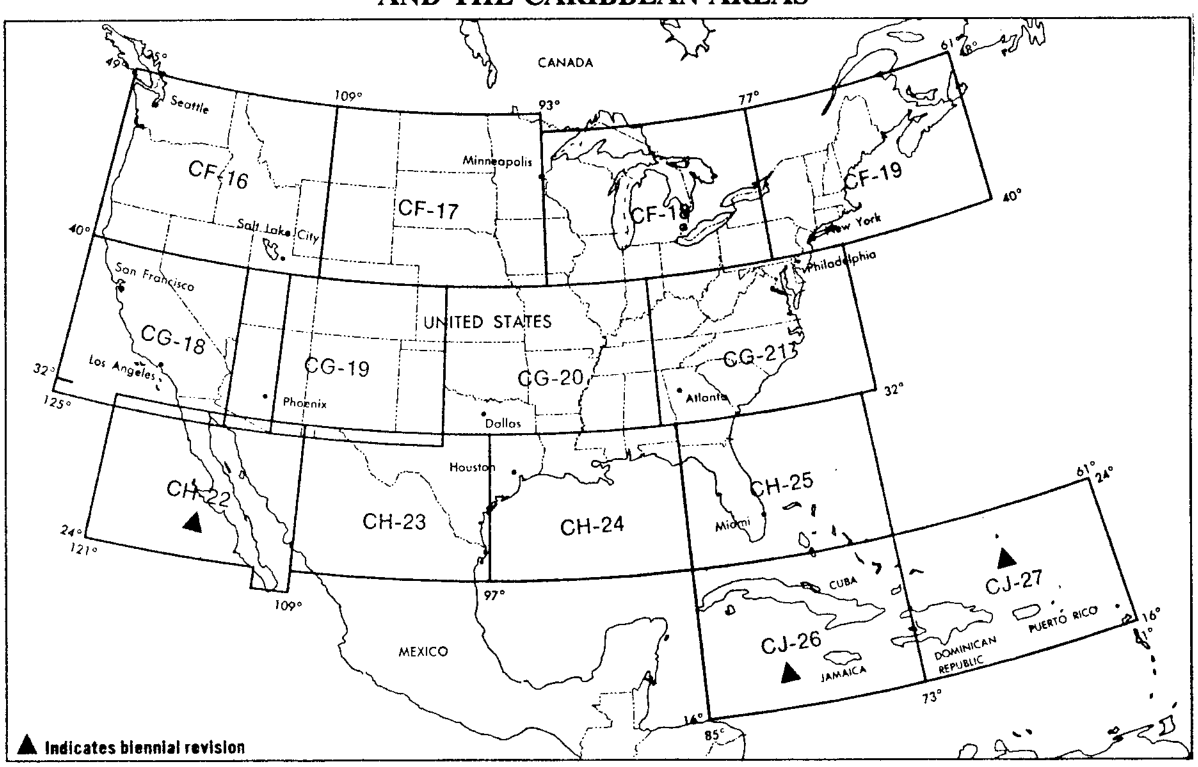
SECTIONAL AND VFR TERMINAL AREA CHARTS FOR ALASKA



WORLD AERONAUTICAL CHARTS FOR ALASKA



WORLD AERONAUTICAL CHARTS FOR THE CONTERMINOUS UNITED STATES, MEXICO, AND THE CARIBBEAN AREAS



ANNEX 2 — RULES OF THE AIR

ICAO REF:	
Chapter 1	Definitions
Surface Area	The airspace contained by the lateral boundry of the Class B, C, D or E airspace designated for an airport that begins at the surface and extends upward..
Danger Area	The term Danger Area is not used within the U.S. or any of its possessions or territories.
Estimated Off-Block Time	The U.S. uses the term Estimated Departure Time for domestic operations.
Expected Approach Time	The U.S. uses the term Expect Further Clearance the time a pilot can expect to receive clearance beyond a clearance limit.
Instrument Meteorological Conditions	The U.S. air traffic service units use the phrase IFR Conditions.
Repetitive Flight Plan (RPL)	The U.S. uses the term Stored Flight Flan for domestic operations.
Total Estimated Elapsed Time	The U.S. uses the term Estimated Time En Route for domestic operations.
Traffic Alert and Collision Avoidance System	An airborne collision avoidance system based on radar beacon signals which operates independent of groundbased equipment. TCAS-I generates traffic advisories only. TCAS-II generates traffic advisories, and resolution (collision avoidance) advisories in the vertical plane.
Visual Meteorological Conditions	U.S. air traffic service units use the phrase VFR Conditions.
Chapter 2	Applicability Of The Rules Of The Air
2.5	Except in an emergency, no pilot of a civil aircraft may allow a person who appears to be intoxicated or who demonstrates by manner or physical indications that the individual is under the influence of drugs (except a medical patient under proper care), to be carried in that aircraft.

ICAO REF:	
Chapter 3	General Rules
3.1.1	In addition, aircraft operations other than for the purpose of air navigation. No person may operate an aircraft other than for the purpose of air navigation, on any part of the surface of an airport used by aircraft for air commerce (including areas used by those aircraft for receiving or discharging persons or cargo), in a careless or reckless manner as to endanger the life or property of another.
3.2.1.2	In addition, aircraft shall not be flown in formation flights when passengers are carried for hire.
3.2.3.2 (d)	All aircraft on the movement area of an aerodrome whose engines are running shall display lights which indicate that fact from sunrise to sunset.
3.2.5	Unless otherwise authorized or required by ATC, no person may operate an aircraft within a Class B, C or D surface area except for the purpose of landing at, or taking off, from an airport within that area In addition, in the case of a helicopter approaching to land, avoid the flow of fixed-wing aircraft. In addition, no person may, within a Class B, C or D surface area operate an aircraft to, from, or on an airport having a control tower operated by the United States unless two-way radio communications are maintained between that aircraft and the control tower.
3.3.1.2.1 (d)	Requirements pertaining to filing flight plans for flights operating across United States borders and for identification purposes are described in FAR 91 and Part 99 of the Federal Aviation Regulation.
3.3.1.2.2	The United States requires that domestic flight plans be submitted at least thirty minutes before departure. For international flights, the United States recommends that they be transmitted so that they are received by ATC authorities in each FIR to be entered, at least two hours prior to entry, unless otherwise provided in that State's requirements.

ICAO REF:	
3.6.2.4	When meteorological conditions fall below the minimum specified for enroute VFR flights, the pilot of the aircraft shall not continue his flight in such conditions, except in emergency, beyond the extent necessary to return to his departure point or to the nearest suitable landing point.
Chapter 4	Visual Flight Rules
4.1 (a)	Except as otherwise authorized by the appropriate air traffic control unit for special VFR flights within Class B, C, D or E surface areas, no person may operate an aircraft under VFR when the flight visibility is less, or at a distance from clouds that is less than that prescribed for the corresponding altitude and class of airspace in the following table:

BASIC VFR WEATHER MINIMUMS

Airspace	Flight Visibility	Distance from Clouds
Class A	Not Applicable	Not Applicable
Class B	3 statue miles	Clear of Clouds
Class C	3 statue miles	500 feet below 1,000 feet above 2,000 feet horizontal
Class D	3 statue miles	500 feet below 1,000 feet above 2,000 feet horizontal
Class E.		
Less than 10,000 feet MSL	3 statute miles	500 feet below 1,000 feet above 2,000 feet horizontal
At or above 10,000 feet MSL	5 statue miles	1,000 feet below 1,000 feet above 1 statute mile horizontal
Class G.		
1,200 feet or less above the surface (regardless of MSL altitude)..		
Day, except as provided in section 91.155(b)..	1 statute mile	Clear of clouds
Night, except as provided in section 91.155(b)..	3 statute miles	500 feet below 1,000 feet above 2,000 feet horizontal
More than 1,200 feet above the surface but less than 10,000 feet MSL..		
Day	1 statute mile	500 feet below 1,000 feet above 2,000 feet horizontal
Night	3 statute mile	500 feet below 1,000 feet above 2,000 feet horizontal
More than 1,200 feet above the surface and at or above 10,000 feet MSL..	5 statute miles	1000 feet below 1,000 feet above 1 statute mile horizontal

ICAO REF:	
4.1 (b)	**Class G Airspace:** Notwithstanding the provisions of paragraph (a) of this section, the following operations may be conducted in class G airspace below 1,200 feet above the surface: (1) **Helicopter.** A helicopter may be operated clear of clouds if operated at a speed that allows the pilot adequate opportunity to see any air traffic or obstruction in time to avoid collision. (2) **Airplane.** When the visibility is less than 3 statute miles but not less than 1 statue mile during night hours, an airplane may be operated clear of clouds if operated in an airport traffic pattern within one-half mile of the runway.
4.1 (c)	Except as provided in 4.2, no person may operate an aircraft under VFR within the later boundaries of the surface areas of Class B, Class C, Class D, or Class E airspace designated for an airport when the ceiling is less than 1,000 feet.
4.1 (d)	Except as provided in 4.2, no person may take off or land an aircraft, or enter the traffic pattern area of an airport under VFR, within the lateral boundaries of the surface area of Class B, Class C, Class D, or Class E airspace designed for an airport - (1) unless ground visibility at that airport is at least 3 statue miles; or (2) if ground visibility is not reported at that airport, unless flight visibility during landing or takeoff, or while operating in the traffic pattern is at least 3 statue miles.
4.2 (a)	When an appropriate ATC clearance has been received, the special weather minimums in this section apply to the operation of an aircraft in a Class B, C, D or E surface area under VFR. (1) No person may operate an aircraft in a Class B, C, D or E surface area under VFR except clear of clouds; (2) No person may operate an aircraft (other than a helicopter) in a Class B, C, D or E surface area under VFR unless flight visibility is at least 1 statute mile; (3) No person may take off or land an aircraft (other than a helicopter) at any airport in a Class B, C, D or E surface area under VFR - (i) unless ground visibility at that airport is at least 1 statute mile; or (ii) if ground visibility is not reported at that airport, unless flight visibility during landing or takeoff is at least 1 statute mile.

ICAO REF:	
4.4	In the United States VFR flight is not permitted within Class A airspace designated in FAR Part 71 unless otherwise authorized by ATC.
4.5	In addition: anywhere, an altitude allowing, if a power unit fails, an emergency landing without due hazard to persons or property on the surface.
4.6	In addition, grid tracks are not used to determine cruising altitudes in polar areas. True tracks are used to determine cruising levels above FL 230 in the area north of Alaska bounded by the true North Pole to 72-00-00N, 141-00-00W to 72-00-00N, 158-00-00W to 68-00-00N, 168-58-23W to point of beginning. The United States has named this area the Anchorage Arctic CTA/FIR for national reference purposes.
Chapter 5	Instrument Flight Rules
5.2.2	See difference under paragraph 4.6
5.3.1	See difference under paragraph 4.6
Further differences which exist by virtue of the fact that the Annex contains no comparable standards for the undermentioned national regulations.	1.0 The regulations covering the selection and use of alternate airports in respect to ceiling and visibility minima, require that:

1.1 Unless otherwise authorized by the Administrator, no person may include an alternate airport in an IFR flight plan unless current weather forecasts indicate that, at the estimated time of arrival at the alternate airport, the ceiling and visibility at that airport will be at or above the alternate airport weather minima;

2.0 Operation under IFR in Class A, B, C, D or E airspace; malfunction reports.

2.1 The pilot in command of each aircraft operated in Class A, B, C, D or E airspace under IFR shall report as soon as practical to ATC any malfunctions of navigational, approach, or communication equipment occurring in flight;

2.2 In each report the pilot in command shall include:

(1) Aircraft Identification;

(2) Equipment affected;

(3) Degree to which the capability of the pilot to operate under IFR in the ATC system is impaired; and

ICAO REF:

(4) Nature and extent of assistance desired from ATC.

3.0 When an aircraft has been cleared to maintain "VFR conditions On Top", the pilot is responsible to fly at an appropriate VFR altitude, comply with VFR visibility and distance from cloud criteria, and to be vigilant so as to see and avoid other aircraft.

4.0 Aircraft Speed

4.1 Unless otherwise authorized by the Administrator, no person may operate an aircraft below 10,000 feet MSL at an indicated airspeed of more than 250 knots (288 m.p.h.).

4.2 Unless otherwise authorized or required by ATC, no person may operate an aircraft within Class B, C or D surface area at an indicated airspeed of more than 200 knots (230 m.p.h.). This paragraph (4.2) does not apply to operations within Class B airspace. Such operations shall comply with paragraph (4.1) of this section.

4.3 No person may operate an aircraft in the airspace underlying Class B airspace, or in a VFR corridor designated through Class B airspace, at an indicated airspeed of mole than 200 knots (230 m.p.h.).

4.4 If the minimum safe airspeed for any operation is greater than the maximum speed prescribed in this section, the aircraft may be operated at that minimum speed.

5.0 Operating Rules and pilot and equipment requirements for flight in Class B airspace.

5.1 Operating Rules. No person may operate an aircraft within Class B airspace except in compliance with the following rules:

(a) No person may operate an aircraft within Class B airspace unless that person has received an appropriate authorization from ATC prior to operation of that aircraft in that area;

(b) Unless otherwise authorized by ATC, each person operating a large turbine engine-powered airplane to or from a primary airport shall operate at or above the designated floors while within the lateral limits of the Class B airspace.

(c) Any person conducting pilot training operations at an airport within Class B airspace shall comply with any procedures established by ATC for such operations in Class B airspace.

ICAO REF:

5.2 Pilot Requirements. No person may take off or land a civil aircraft at an airport within Class B airspace or operate a civil aircraft within Class B airspace unless:

(a) The pilot in command holds at least a private pilot certificate; or

(b) the aircraft is operated by a student pilot who has met the requirements (FAR 61.95).

5.3 Communications and navigation requirements. Unless otherwise authorized by ATC, no person may operate an aircraft within Class B airspace unless that aircraft is equipped with -

(a) For **IFR** operations. An operable VOR or TACAN receiver, and

(b) For **all** operations. An operable two-way radio capable of communications with ATC on appropriate frequencies for that Class B airspace.

5.4 Transponder Requirements. No person may operate an aircraft in Class B airspace unless the aircraft is equipped with the applicable operating transponder and automatic altitude reporting equipment.

6.0 Operating Rules and pilot and equipment requirements for in Class C airspace.

6.1 General. For the purpose of this section, the primary airport is the airport designated in FAR Part 71, for which the Class C airspace is designated. A satellite airport is any other airport within the Class C airspace.

6.2 Deviations. An operator may deviate from any provisions of this section under the provisions of an ATC authorization issued by the ATC facility giving jurisdiction of the Class C airspace. ATC may authorize a deviation on a continuing basis or for an individual flight, as appropriate.

6.3 Arrivals and Overflights. No person may operate an aircraft in Class C airspace unless two-way radio communication is established with the ATC facility having jurisdiction over the Class C airspace prior to entering that area and is thereafter maintained with the ATC facility having jurisdiction over the Class C airspace while within that area.

6.4 Departures. No person may operate an aircraft within Class C airspace except as follows:

ICAO REF:

(a) From the primary airport or satellite airport with an operating control tower, unless two-way radio communications is established and maintained with the control tower, and thereafter as instructed by ATC while operating in the Class C airspace.

(b) From a satellite airport without an operating control tower, unless two way radio communication is established as soon as practical after departing and thereafter maintained with the ATC facility having jurisdiction over the Class C airspace.

6.5 Traffic patterns. No person may take off or land an aircraft at a satellite airport within Class C airspace except in compliance with FAA arrival and departure traffic patterns.

6.6 Equipment requirements. Unless otherwise authorized by the ATC facility having jurisdiction over the Class C airspace, no person may operate an aircraft within Class C airspace unless that aircraft is equipped with the applicable equipment specified in FAR Part 91.215.

7.0 Except for persons operating gliders below the floor of Class A airspace, no person may operate an aircraft in Class B, C, D or E airspace of the 48 contiguous States and the District of Columbia above 10,000 ft MSL, excluding that airspace at and below 2,500 feet AGL, unless that aircraft is equipped with an operable radar beacon transponder having at least a Mode 3/A 4096-code capability, replying to Mode 3/A interrogation with the code specified by ATC, and automatic altitude reporting equipment having a Mode C capability that automatically replies to Mode C interrogations by transmitting pressure altitude information in 100-foot increments.

8.0 Compliance with ATC clearances and instructions

(a) When an ATC clearance has been obtained, no pilot in command may deviate from that clearance, except in an emergency, unless an amended clearance is obtained. A pilot in command may cancel an IFR flight plan if that pilot is operating in VFR weather conditions outside of Class A airspace. If a pilot is uncertain of the meaning of an ATC clearance, the pilot shall immediately request clarification from ATC.

ICAO REF:	
	(b) Except in an emergency, no person may operate an aircraft contrary to an ATC instruction in an area in which air traffic control is exercised.
	(c) Each pilot in command who, in an emergency, deviates from an ATC clearance or instruction shall notify ATC of that deviation as soon as possible.
	(d) Each pilot in command who is given priority by ATC in an emergency, shall submit a detailed report of that emergency within 48 hours to the manager of that ATC facility, if requested by ATC.
	(e) Unless otherwise authorized by ATC, no person operating an aircraft may operate that aircraft according to any clearance or instruction that has been issued to the pilot of another aircraft for radar air traffic control purposes.
Appendix 1	
4.1.1	The flashing white signal to aircraft in flight, meaning "Land at this aerodrome and proceed to apron" is not used in the States. In addition, the alternating red and green signal to aircraft on the ground or in flight means: Exercise extreme caution.

ANNEX 4 — AERONAUTICAL CHARTS

UNITED STATES

Chapter 1	Definitions
Air Taxiway	The U.S. does not depict defined surfaces for air taxiing of helicopters.
Danger Area	The term "Danger area" will not be used in reference to areas within the United States or in any of its possessions or territories.
FATO (Final Approach and Take-off Area)	The U.S. does not depict Final Approach and Takeoff Areas (FATOs).
Helicopter Stand	The U.S. does not use this term.
Prohibited Area Restricted Area	The United States will employ the terms "Restricted area" and "Prohibited area" substantially in accordance with the definitions established and, additionally, will use the following terms: "Alert area" — Airspace which may contain a high volume of pilot training activities or an unusual type of aerial activity — neither of which is hazardous to aircraft. "Controlled firing area" — Airspace wherein activities are conducted under conditions so controlled as to eliminate the hazards to nonparticipating aircraft and to ensure the safety of persons and property on the ground. "Warning area" — Airspace which may contain hazards to nonparticipating aircraft in international airspace. "Maneuvering area" — This term is not used by the United States. "Military Operations Area (MOA)" — An MOA is an airspace assignment of defined vertical and lateral dimensions established outside Class A Airspace to separate/segregate certain military activities from IFR traffic and to identify for VFR traffic where these activities are conducted. "Movement area" — Movement area is defined by the United States as "The runways, taxiways, and other areas of an airport which are utilized for taxiing, take-off and landing of aircraft, exclusive of loading ramp and parking areas."
TLOF (Touchdown And Lift-off Area)	The U.S. does not use this term.

UNITED STATES—Continued

Chapter 2	
2.1	The title of charts produced by the United States are not those provided for in Annex 4
2.2.1	The marginal note layouts, in some cases, differ from those set forth in Appendices 1, 5 and 6.
2.4.1	Visibility distances are expressed in statute miles and fractions thereof.
2.4.4	Conversion scale (meters/feet) is not shown on Radio Navigation Charts.
Chapter 3	
3.1	The United States produces an Aerodrome Obstruction Chart which covers the basic requirements called for by Aerodrome Obstruction Chart — ICAO Type A.
Chapter 4	
4.1	The United States produces an Aerodrome Obstruction Chart which covers the basic requirements called for by Aerodrome Obstruction Chart — ICAO Type B.
Chapter 5	
5.8.1	The navigation grid on United States Aircraft Position Chart 3097 comprises lines parallel to 54° West Meridian and the navigation grid on United States Aircraft Position Chart 3096 comprises lines parallel to 92° West Meridian. These changes to the ICAO Standard were made to provide navigation grid lines vertical to a great circle projection base.
Chapter 6	
6.9.1.1	Only outbound magnetic bearings from VOR facilities and inbound magnetic bearings to low/medium frequency radio navigation facilities are shown.
Chapter 9	
9.3.1	Charts covering continental United States between latitudes 24° and 52° North are based on standard parallels at 33° and 45° and between latitudes 52° and 72° North on standard parallels at 55° and 65°.

UNITED STATES—Continued

9.4.1	The United States uses a sheet numbering system which differs from the index in Appendix 7.
9.8.3.2*	The elevation of the highest point on any sheet is not always cleared of hypsometric tinting.
9.10.1	Heliports are not shown.
Chapter 10	
10.8.3.2*	The elevation of the highest point on any sheet is not always cleared of hypsometric tinting.
Chapter 12	
12.2.1	Stopways are not indicated.
12.5.5.2.1	The datum (MSL) is stated in the Instrument Approach Chart legend, not on the chart.
12.6.2	Runway threshold elevations are not shown.
Chapter 13	
13.6.1.d Surface type for heliports.	The U.S. does not show "type of surface for heliports".
13.6.2 Elevated helidecks etc.	The U.S. does not show "surface level, elevated or helidecks".
Appendix 2	
No. 21	Tidal flats are shown in brown stipple over the blue open water tint.
No. 45	Rocks awash are shown by a six-armed symbol as adopted by the International Hydrographic Bureau.
No. 54, 61	Spaces between sides of bridge and road or railroad symbols are filled solid.
No. 70	Oil or gas fields are shown with an oil well derrick symbol.
No. 77	Ruins are shown by a solid square, properly annotated.

UNITED STATES—Continued

No. 94	The runway surface indicator (letter H) and the lighting indicator (letter L) are not normally used on high altitude Radio Navigation Charts. Only those aerodromes with a minimum of 5,000 feet hard-surfaced runways are shown. The letter H is not used on low altitude Radio Navigation Charts. All aerodromes depicted have hard-surfaced runways, excepting that where the letter "S" follows the runway length, the runway surface is soft. On Visual Navigation Charts of the 1:500 000 scale, a miniature runway layout depiction indicates aerodromes with hard-surfaced runways at least 1,500 feet long.
No. 110	Aerodrome traffic zones are termed "SURFACE AREAS" in United States usage. These are all of standard dimensions. Limits are not shown, but aerodromes at which SURFACE AREAS have been established are indicated by a colour coded aerodrome symbol.
No. 113	Limits of advisory areas are shown on Radio Navigation Charts with a crenellated line. This depiction is indicated in the legend as the border of an Air Route Traffic Control Center (ARTCC).
No. 116	The nomenclature "non compulsory" is used instead of "on request" for appropriate position reporting points.
No. 127	Isogonic lines are shown on Radio Navigation Charts only as short sections of continuous lines extending inward from the neat lines.

*Recommended Practice.

ANNEX 10 — VOLUME 1 — AERONAUTICAL TELECOMMUNICATIONS

PART I

Chapter 2

2.5.3.2.3 2.5.5.1.1(a)	The U.S. does not currently require that all Mode S transponders be equipped with pressure altitude encoded in the information pulses in Mode C replies.
2.5.5.3(a) & (b)	The U.S. does not currently require that Mode S transponders installed on aircraft with gross mass in excess of 5 700 kg or a maximum cruising time airspeed capability in excess of 324 km (175 knots) shall operate with antenna diversity as prescribed in Part 1, 3.8.2.10.4, if: (a) the aircraft individual certificate of airworthiness is first issued on or after 1 January 1990; or (b) Mode S carriage is required on the basis of Regional Air Navigation agreement in accordance with 2.5.3.3.1 and 2.5.3.3.2.
3.1.7.3.1(c)	When necessary to achieve coverage to the edges of the localizer course, the United States authorizes coverage over a greater distance than that specified in 3.1.7.3.1(c), i.e. up to 1,200 m (4,000 feet) along the localizer course centerline.

PART II

Chapter 4

4.1.5.2	In the U.S. the shortage of communications channels, compared with the total operational requirement, has resulted in the geographical separation between facilities working on the same frequency being considerably less (up to 50 per cent reduction) than the Standard defined for such separation.

ANNEX 10 — VOLUME 2 — AERONAUTICAL TELECOMMUNICATIONS

Chapter 3

3.3.2	Class B traffic, including reservation messages pertaining to flights scheduled to depart within 72 hours, shall not be acceptable for transmission over U.S. Government operated AFTN circuits, except in those cases where it has been determined by the U.S. that adequate non-government facilities are not available.

Chapter 4

4.4.2	"In the Caribbean Region, United States industry-operated AFTN terminals will continue to accept messages in both ICAO and non-ICAO formats." The United States now accepts only messages in ICAO format from other states, including the Caribbean Region.

Chapter 5

5.2.1.3.1.1	The U.S. will use the term "hundred" in stating altitude numbers by radiotelephone. Whole hundreds will be spoken as follows: 400 — "Four hundred" 4500 — "Four thousand five hundred"
5.2.1.3.1.2	The U.S. will use the term "point" in lieu of "decimal" in stating frequencies: 126.55 mHz — "One two six point five five" 8828.5 mHz — "Eight eight two eight point five"
5.2.1.6.1	Air route traffic control centres will use "center" rather than "control" in their radiotelephone identification. Example: "Washington Center" "Approach control service units will use "approach control" or "departure control" rather than "approach" in their radiotelephone identification.

	Example: "Washington Approach Control" or "Washington Departure Control" Aerodrome control towers will use "ground control" or "clearance delivery" rather than "tower" in their radiotelephone identification, where appropriate, to identify ground control services. Example: "Washington Ground Control" or "Washington Clearance Delivery"
5.2.1.6 5.2.1.6.2.1.1 5.2.1.6.2.2.1	U.S. procedures allow abbreviation of only Type a) call signs and limit abbreviation to not less than **three** characters following the first character of the registration marking or the manufacturer of the aircraft. Also, the U.S. does not use call signs comprised of aircraft operating agency telephony designators in combination with aircraft registration markings (Type b).

Remarks	To facilitate understanding, Examples (5.2.1.6) should follow rather than precede corresponding provisions which govern them (5.2.1.6.2.1.1 and 5.2.1.6.2.2.1).
5.2.2.1.1.1	The United States FARs do not require that a continuous airborne guard on VHF121.5 mHz be maintained.
5.2.2.1.1.2	The United States FARs do not require that a continuous airborne guard on VHF 121.5 mHz be maintained.

ANNEX 11 — AIR TRAFFIC SERVICES

ICAO REF:	
Chapter 1	
Traffic Alert and Collision Avoidance System	An airborne collision avoidance system based on radar beacon signals which operates independent of groundbased equipment. TCAS-I generates traffic advisories only. TCAS-II generates traffic advisories, and resolution (collision avoidance) advisories in the vertical plane.
Chapter 2	
2.6	The term Class F airspace is not used in the designation of U.S. Airspace.
2.9 2.11 Appendix 1 Appendix 2	Converting the present United States system for identifying ATS routes and significant points to conform to the provisions of amended paragraphs 2.9 — 2.9.2, 2.11 — 2.11.3, Appendix 1 and Appendix 2 is an effort of considerable magnitude and complexity. The United States has an ongoing program to accomplish the conversion but it is estimated that a period of two to five years will be required for full compliance. (It should be noted that the term "Class B airspace" as used in the U.S. is more restrictive than that specified by ICAO. Flights within Class B Airspace in the U.S. must be operated in accord with the provisions of U.S. FAR 91.90.)
Chapter 3	
3.3.3 Exception Clause	Clearances may be issued to conduct flight in VFR conditions without a pilot request if the clearance would result in noise abatement benefits or when a pilot conducts a practice instrument approach.

ICAO REF:	
Chapter 4	
4.2.2(b),	No provision is made for the issuance of collision hazard information to flights operating in Class G airspace.
4.3.4.4(h) 4.3.4.8	The U.S. requires that the current altimeter setting be included in the ATIS broadcast. Information contained in a current ATIS broadcast, the receipt of which has been acknowledge by an aircraft, is not included in a directed transmission to the aircraft unless requested by the pilot.
4.3.5 4.3.6 4.3.7	The order in which information is listed in ATIS broadcast messages is not mandated and certain elements are regarded as optional.
Appendix 1	
2.2.1	Routes designated to serve aircraft operating from 18,000 MSL up to and including FL450 are referred to as "Jet Routes" and are designated with the letter "J" followed by a number of up to three digits.

ANNEX 15 — AERONAUTICAL INFORMATION SERVICES

Chapter 2

Danger Area — The term "Danger Area" will not be used in reference to areas within the United States or in any of its possessions or territories.

Prohibited Area / Restricted Area — The term "Restricted Area" and "Prohibited Area" will be employed substantially in accordance with the definitions established and, additionally, the following terms will be used:

Alert Area — Airspace which may contain a high volume of pilot training activities or an unusual type of aerial activity, neither of which is hazardous to aircraft. Alert Areas are depicted on aeronautical charts for the information of nonparticipating pilots. All activities within an Alert Area are conducted in accordance with Federal Aviation Regulations, and pilots of participating aircraft as well as pilots transiting the area are equally responsible for collision avoidance.

Controlled Firing Area — Airspace wherein activities are conducted under conditions so controlled as to eliminate hazards to nonparticipating aircraft and to ensure the safety of persons and property on the ground.

Warning Area — Airspace which may contain hazards to nonparticipating aircraft in international airspace.

Maneuvering Area — This term is not used by the United States.

Military Operations Area (MOA) — An MOA is an airspace assignment of defined vertical and lateral dimensions established outside Class A Airspace to separate/segregate certain military activities from IFR traffic and to identify for VFR traffic where these activities are conducted.

Movement Area — The runways, taxiways, and other areas of an airport/heliport which are utilized for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports/heliports with a tower, specific approval for entry onto the movement area must be obtained from ATC.

Chapter 4

4.2.8.2 — The U.S. does not issue AIP Supplements. Corrections or changes from the latest amendments to the AIP are carried as NOTAMS.

Remarks — Aeronautical Information Publication (AIP).

4.5 — The U.S. does not issue an AIP Supplement.

Chapter 5

5.1.1.2 — The U.S. does not routinely issue "trigger NOTAMS" referencing published material, when an AIP amendment or supplement is issued.

5.2.1 — The current U.S. system numbers international NOTAMS consecutively by the location in the A) field. The U.S. routinely issues over 70,000 out-going international NOTAMS each year. Only one series, "A" is used for international distribution.

This precludes numbering the NOTAMS by the originator.

Remarks — AIP GEN-1.6.2.2

5.2.3 — The U.S. periodically issues multi-part NOTAMS which are transmitted as multiple telecommunication messages. The nature of the NOTAM material is such that it will not always fit in one message.

5.2.8.1 — The monthly check-list of NOTAMs does not specifically reference printed publications, such as AIP Amendments.

5.2.8.3 — A monthly printed plain language summary of NOTAMs in force is not issued. The International NOTAM publication, issued bi weekly, is not inclusive of all U.S. international NOTAMs

5.3.2 — The U.S. does not use the System NOTAM format at this time. The format used is based on the previous ICAO Class I format. See notes on Appendix 5 for details.

Chapter 8

8.1.2.1.f — NOTAMs relating to bird hazards are relayed as local NOTAM information and are not disseminated internationally. The information is available from the local Flight Service Station during preflight briefing.

Remarks — Notices to Airmen (NOTAM's) Handbook 7930.2.

Appendix 2

SNOWTAM Format — The U.S. does not use the SNOWTAM for issuance of winter weather information. Snow conditions are reported using our current international NOTAM format (Class I).

Appendix 5

NOTAM Format	The U.S. is not prepared to transition to the System NOTAM format. NOTAMs are processed in the previous ICAO Class I format
1.2 General	Multiple conditions, for a single location, may be reported in a NOTAM.
2 NOTAM numbering	The U.S. numbers NOTAMs consecutively by location, not by country of origin. Due to the volume of international NOTAMs generated by the U.S., the current U.S. numbering scheme is expected to continue.
3 Qualifiers	The current software will not accept the Item Q qualifiers line.
5 Item B	Item B is currently issued as an eight digit date/time group
	The U.S. also uses the initials "WIE" (With Immediate Effect) for NOTAMs that take effect immediately upon issuance.
	The U.S. does not include an Item B in NOTAMCs. The assumption is that all cancellations take effect immediately when issued. While this time could be added to NOTAMCs, the U.S. position is that this is unnecessary.
6 Item C	Item C, like item B, is currently issued as an eight digit date/time group
	The U.S. also uses the initials "UFN" (Until Further Notice) for NOTAMs that have an uncertain duration.
8 Item E	U.S. NOTAMs do not contain Item E information for NOTAMCs.
Remarks	Item E contains the NOTAM Code (Q-code) in addition to plain language and ICAO abbreviations.

ANNEX 16 — ENVIRONMENTAL PROTECTION

Volume I — Aircraft Noise

Chapter 2	
Para. 2.1.1	For type design change applications made after August 14, 1989, if an airplane is a Stage 3 airplane prior to a change in type design, it must remain a Stage 3 airplane after the change in type design regardless of whether Stage 3 compliance was required before the change in type design.
Para. 2.1.2	The Annex 16 noise level requirements are as much as 5 EPNdB more stringent than those of the U.S. FAR Part 36, Section 36.7(d)(3)(ii) for airplanes that do not have high bypass ratio turbojet engines.
Chapter 3	
Para. 3.1.1	For type design change applications made after August 14, 1989, if an airplane is a Stage 3 airplane prior to a change in type design, it must remain a Stage 3 airplane after the change in type design regardless of whether Stage 3 compliance was required before the change in type design.
Para. 3.7.6	Decibel limitations on the use of equivalent flight test procedures are not specified for the U.S. FAR 36 approach test conditions.
Chapter 5	
Para. 5.4.1	The Annex 16 noise level requirements for propeller driven airplanes over 5700 kg are more stringent than the U.S. FAR 36 requirements for four-engine airplanes in the gross weight range of 20,000 to 250,000 kg by 0 to 3 dB with the maximum differences at 34,000 kg. For three-engine airplanes in the gross weight range of 29,000 to 57,000 kg, Annex 16 is more stringent by 0 to 1 dB with the maximum difference occurring at 34,000 kg.
Chapter 6	
Para. 6.1.1	Applies to new all propeller-driven airplane types below 19,000 lb. (8640 kg.) in the normal, commuter, utility, acrobatic, transport, or restricted categories for which the noise certification tests are completed before December 22, 1988.
Chapter 8	
Appendix 2 Para. 3.5.2	Annex 16 requires a 30-second calibration signal, whereas the U.S. FAR 36 requires only a 15-second calibration signal.
Appendix 2 para. 3.5.5	The U.S. FAR 36 differs from Annex 16 in that it does not have a six-month requirement for checking wind-screen insertion losses.
Appendix 2 para. 9.1.3	For the flight test conditions not identical to reference conditions, Annex 16 specifies the use of the integrated correction procedure on both takeoff and approach, whereas the U.S. FAR 36, paragraph A36.11(f)(2) includes the integrated procedure only for takeoff test adjustments.
Appendix 2 para. 9.3.2.2	Annex 16 requires adjustment for multiple PNL peaks which are within 2 dB of PNLTM, whereas the U.S. FAR 36 has no corresponding requirement.
Appendix 4	Helicopters. The U.S. has not adopted helicopter noise standards to date. Proposed standards are currently under review.
Chapter 10	
Para. 10.1.1	Applies to new, amended, or supplemental type certificates for propeller driven airplanes not exceeding 8640 kg. (19,000 lb.) for which noise certification tests have not been completed before December 22, 1988.
Chapter 11	
Para. 11.1	FAR Appendix J was effective September 11, 1992 and applies to those helicopters for which application for a type certificate was made on or after March 6,1986.
Para. 11.6	Far J36.105(c) requires an adjustment to the reference air speed prescribed in 11.5.2 such that each flyover test is conducted at the same advancing blade tip Mach number as associated with reference conditions. Chapter 11 does not contain a similar provision.
Para. 11.6	FAR J36.105(b)(2) prescribes a +/- 15 meter limitation on the allowed vertical deviation about the reference flight path during the flyover test procedure. Chapter 11 does not have a similar requirement.
Appendix 7 Para. 5.2	FAR J36.205(c) requires an adjustment to account for the difference in duration between the reference airspeed and the adjusted reference airspeed prescribed in FAR J36.105(c). Appendix 7 does not contain a similar provision.

Volume II — Aircraft Engine Emissions

Chapter 1	
	The United States currently has regulations, prohibiting intentional fuel venting from turbojet, turbofan and turboprop aircraft but we do not now have a regulation preventing the intentional fuel venting from helicopter engines and will not have such a regulation in effect on the applicable date of February 18, 1982. The U.S. will consider revising its national regulations under a separate rulemaking action at a later date and will report to the Council if and when this difference has been eliminated.